

PoliTO Sustainable Campus: An Interdisciplinary Design Education Experience

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SENSES & SENSIBILITY 2019  
**LOST IN**  
**(G)LOCALIZATION**

| November 27th to 29th  
| Lisbon, Portugal



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Faculdade de Design,  
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**SENSES & SENSIBILITY '19**  
LOST IN (G)LOCALIZATION

# **SENSES & SENSIBILITY'19: LOST IN (G)LOCALIZATION**

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# PoliTO Sustainable Campus: An Interdisciplinary Design Education Experience

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## Abstract

Education has an essential role in teaching people to understand, manage and change their environment. Higher Education Institutions play a crucial role in the education of future generations, in the development of scientific research which has to be able to meet societal goals and in the dissemination of knowledge inside society, also concerning the capacity of fostering sustainable development. On this basis, the contribution aims to bring to light the experience developed within the framework of a university educational path, the Young Talent Programme project. It involved 236 students from different subject areas (from design to engineering, from architecture to urban planning), who have reasoned around six themes closely related to the theme of sustainability: transport and sustainable mobility, renewable resources and energy production, building and energy efficiency, food, water and waste. What we want to show in the contribution is how the cross-fertilization that can occur in a polytechnical context could be useful for the development of a more complex and full project, and how the discipline of design can become a tool not only for the design of new products, services or communications but also a fundamental tool to mediate the knowledge involved, integrating the different skills and increasing the effects.

## Keywords:

**Sustainability, Interdisciplinary Design, Design Method.**

# 1. EDUCATION FOR SUSTAINABLE DEVELOPMENT

## 1.1 AGENDA 2030 AND SUSTAINABLE DEVELOPMENT GOALS

On 25 September 2015, the United Nations approved the Global Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), divided into 169 targets and over 240 indicators to be achieved by 2030 (United Nations, n.d.).

On this historic occasion, a clear judgement was expressed on the unsustainability of the current development model. In this way, and this is the highly innovative character of Agenda 2030, the idea that sustainability is only an environmental issue is definitively overcome, and an integrated vision of the different dimensions of development is affirmed, not only on the environmental level but also on the economic and social levels.

Indeed, one of the innovative principles of the Agenda is the integrated view of the dimensions of sustainability and the recognition of synergies among the goals (Giovannini, 2018).

The SDGs were designed as a continuum of the Millennium Development Goals (MDGs), eight goals that in 2000 all UN member states pledged to achieve by 2015. Since their adoption, essential goals have been reached, but the goals set have not been fully realized.

The SDGs present a more ambitious agenda, as they seek to eradicate poverty rather than reduce it, and include more demanding targets on health, education and gender equality. They are also more complex and comprehensive because they include new issues such as climate change, sustainable consumption, innovation in all fields and the importance of ensuring peace and justice for all (see Fig. 1).



Fig. 1. Sustainable Development Goals (United Nations, 2015)

## 1.2 GOAL 4: QUALITY EDUCATION

Education has an essential role in teaching people to understand, manage and change their environment. Some research points out that the educational system is sometimes not able to adequately meet this need (Ward, 1990). Because of the failure of education in the relationship between humans and the environment and communication, children today cannot understand the outside world and they cannot establish healthy relationships with the physical environment. Education for sustainability, therefore, has an important role and the mission to fill this gap.

Higher education institutions play a crucial role in the education of future generations, in the development of scientific research which has to be able to meet societal goals and in the dissemination of knowledge inside society, also concerning the capacity of fostering sustainable development, defined as the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”, according to the Brundland Report (*Report of the World Commission on Environment and Development: Our Common Future*, 1987). In this context, education for sustainable development is explicitly recognized in target 4.7 of Agenda 2030., among the characteristics of goal 4: quality education. It reads: “4.7 by 2030 ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture’s contribution to sustainable development.”

To paraphrase this target, in order to contribute to the creation of a more sustainable world,

individuals have to become agents of change, equipping themselves with knowledge, skills, values and attitudes that enable them to make informed decisions and act responsibly for environmental integrity, economic sustainability and a fairer society for present and future generations. Education is therefore crucial for achieving sustainable development and at the same time sustainability, in its social, environmental and economic meanings, has become a fundamental prerequisite at all stages of the design process (Tamborrini, 2009). This can be seen with even greater emphasis when dealing with issues relating to mobility and transport, energy and waste management, resource consumption and everything related to the world of food and nutrition.

## 1.3 THE ROLE OF GREEN OFFICE

In this context, Green Offices, laboratories and teams within universities and research centres that bring together students, researchers and lecturers with the aim of coordinating initiatives and projects with a strong social and environmental impact, are becoming increasingly important.

Their increasing popularity, following the first Dutch experience in 2010, shows that universities are increasingly oriented towards research, training and the development of active citizenship (Cucchiara, 2018). However, such activities should not and cannot be relegated to a few but draw their strength in the involvement of different disciplines and people with different roles, from student to professor, from technical staff to administration. It is the people who live every day in contact with a situation, the best to involve in the design. And who better than the students themselves who live and inhabit the campuses daily to know their needs, desiderata and languages?

From this necessity was born the collaboration

with the Young Talent Programme project by the Green team (*PoliTo Sustainable Campus* - Home, n.d.) of the Politecnico di Torino, born in 2015.

## 2. YOUNG TALENT PROGRAMME PROJECT

The Young Talent Programme project was launched in 2014 by the Politecnico di Torino with CRT Foundation.

The course involves each year 240 best students from the areas of engineering, architecture, territorial planning and design. Students follow a personalized training path and are granted a fee reduction, a student pass for public transport and a museum pass. The Green Team coordinates the Young Talent Programme project started in the academic year 2018/2019 using a project-problem-based approach where involved actors work together and share ideas in different forms (seminars, workshops, case studies, visits) to address the complexity of wicked problems. Objectives of the project are twofold: on the educational side to propose an experiment of student's involvement in real-life processes while on the research side to create a new kind of support to the decision-makers of the Sustainable Path project.

In the first semester, students of architecture were involved in the Ecological Footprint course. Groups of students collaborate with different volunteering associations in order to assess not only the environmental impact of their actions but also the social and economic ones.

In the second semester, students were divided into groups corresponding to different areas of sustainability of a university campus. In this course, each group analyzed more in detail the complex system of sustainability inside a university campus and developed new strategies with the support of the Green Team members and external actors.

### 2.1 PARTICIPANTS

For the 2018/2019 academic year, the Young Talent Programme project involved 236 students from different polytechnic areas such as engineering, architecture, urban planning and design. As can be seen from Table 1, the disciplines do not cover the entire offer of the University itself (in fact, there are no students from the chemical engineering field), and there is a strong imbalance towards the engineering disciplines, which cover 85% of the total. All students were then divided, following their own choices, into the six themes closely related to the theme of sustainability: transport and sustainable mobility, renewable resources and energy production, building and energy efficiency, food, water, and waste.

Area	Discipline	Students
Architecture & Design	Architecture	18
Architecture & Design	Design & Communication	13
Architecture & Design	Territorial, urban, environmental and landscape planning	3
Engineering	Aerospace engineering	38
Engineering	Automotive engineering	8
Engineering	Biomedical engineering	12
Engineering	Cinema and media engineering	2
Engineering	Computer engineering	37
Engineering	Electrical engineering	1
Engineering	Electrical and communications engineering	3
Engineering	Electronical engineering	17
Engineering	Energy engineering	7
Engineering	Management engineering	7
Engineering	Mathematics for engineering	22
Engineering	Material engineering	2
Engineering	Mechanical engineering	23
Engineering	Physical engineering	23

Table 1. Students and disciplines involved in the Young Talent Programme project.



Concerning the workshops that will be analyzed in this contribution, and therefore the workshop related to the theme of food and the one related to the theme of waste, both involved 34 students, with a respective percentage of 17% and 12% of the component related to the area of Architecture and Design. The students coming from the engineering disciplines are instead well distributed, revealing the first result of differentiation of interests that does not only refer to the course of study undertaken.

### 3. THE ROLE OF DESIGN

As mentioned before, the disciplines involved different from each other. However, from a design-oriented perspective, we can see how all these can generate a system, to define the relationship between possible and achievable. The discipline of design has always been influenced by the active transitions that take place in the context, as well as by the whole field of material culture, economy, society and more widely of culture and history. As Celaschi (Celaschi, 2008) argues, a design-driven approach does not only consider this discipline, but we notice how it intersects with other disciplines such as art, technology, economics and the humanities, managing the balance between them (see Fig. 2). Design thus takes on cultural value and becomes a tool for enhancing skills, a mediator and integrator of knowledge, a mediator between needs, a tool for tracing new routes in innovation, a methodological tool for exploring new sectors, a tool for approaching complexity, a tool for reading social, territorial and productive changes, a tool for guiding a society of networks, sharing and sustainability (Buchanan, 2001).

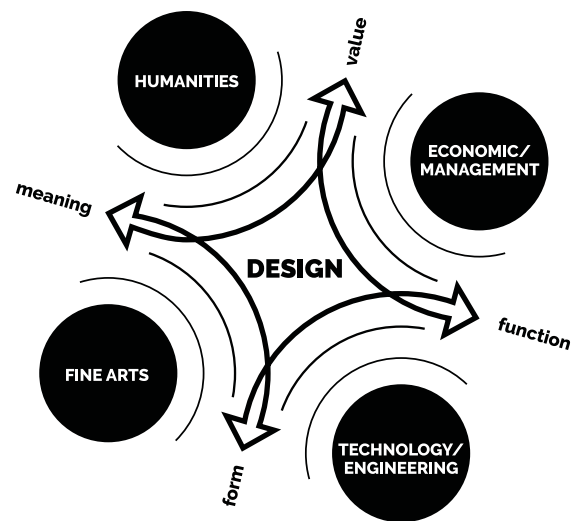


Fig. 2. Areas of approach to design that direct meta-design research (Celaschi, 2008)

At the same time, however, design is the discipline able to guide towards change by influencing the choices and development of new products and services (Buchanan, 2001). Trying to make a comparison with the Krebs Cycle, Oxman (Oxman, 2016) comes to define a Krebs Cycle of Creativity (KCC) (see Fig. 3). In this reasoning, we see how the creative energy and the project can be described in their perpetuation as a biological relationship of mutual exchange. The four modalities of human creativity (science, engineering, design and arts) replace the carbon cycle taking place according to their characteristics and roles in the project. Indeed, as Oxman writes: “The role of Science is to explain and predict the world around us; it ‘converts’ information into knowledge. The role of Engineering is to apply scientific knowledge to the development of solutions for practical problems; it ‘converts’ knowledge into utility.

The role of Design is to produce embodiments of solutions that maximize function and augment human experience; it 'converts' utility into behaviour. The role of Art is to question human behaviour and create awareness of the world around us; it 'converts' behaviour into new perceptions of information, re-presenting the data that initiated the KCC in Science" (Oxman, 2016).

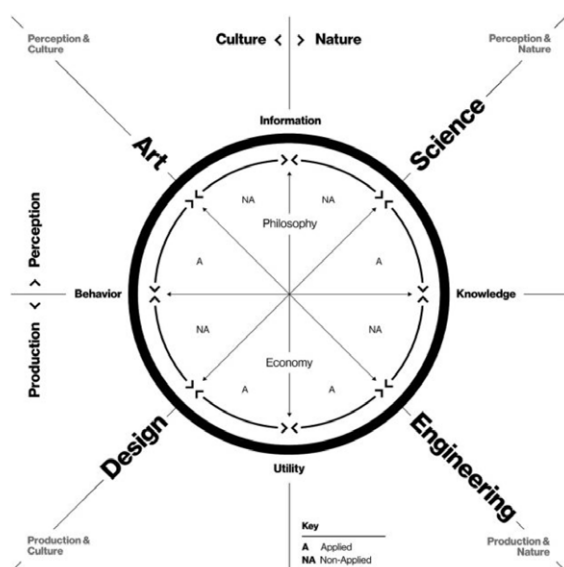


Fig. 3. Krebs Cycle of Creativity (Oxman, 2016)

This shows that knowledge can no longer be found and relegated only within its disciplinary boundaries. It, therefore, becomes fundamental to interweave different areas that necessarily define new fields of action and new potential. In doing so, design can offer itself as a tool through which new worldviews can be developed; a means that must necessarily be integrated with the requirements of extemporaneous society (Scalera, 2015). It becomes connective, able to produce innovative solutions thanks to the connection between people, objects, nature, technologies and production capacities.

## 4. DESIGN-DRIVEN TEAMS' EXPERIENCES

"Learning is the process whereby knowledge is created through the transformation of experience". This is what educator David Kolb (Kolb, 1984) stated in 1984, developing an experiential learning model, called Kolb cycle. According to the most recent neurobiological studies our brain acquires concepts, notions and relationships much faster if it is pushed to put them into practice itself. Physical and emotional involvement, therefore, facilitates attention and memory.

The contribution will specifically illustrate the workshops that have covered the issues of food and waste, which have seen involvement of the discipline of design as regards both students, teachers and assistants to the laboratory. Starting from field analysis and direct experiences with the topic, be it food or waste, students had the opportunity to highlight critical issues and potential, arriving at the development of design concepts ranging from communication strategies, viral videos and forms of gamification, to new services and new ways of using spaces to improve life on campus, better understand the resources used daily, inform and disseminate good sustainable practices.

### 4.1 MENS SANA: PROJECTS AROUND FOOD<sup>1</sup>

Starting from the exploration of the food matter, the module has set itself the objective of understanding, analysing, developing and experimenting with some decisive and sustainable scenarios for the university. Students had the opportunity to think about the

<sup>1</sup> "Mens sana: projects around food" involved Paolo Tamborrini, Cristian Campagnaro, Sara Ceraolo, Raffaele Passaro, Nicolò Di Prima, Silvia Favaro, Debora Fino, Alessia Toldo.

food topic through the contribution of different actors that intertwine different knowledge involving, in addition to the discipline of design, also sociology, anthropology and chemistry. The visit to the FICO Eataly World food park in Bologna and the experience with the Food Design Lab of the Department of Architecture and Design of the Politecnico di Torino (see Fig. 4), gave students new points to think about, starting from the knowledge of production processes to the transformation of the product itself. The results showed very different concepts, but all proposed starting from a careful investigation of what happens inside the university and the needs and wishes of the people who live and frequent the campus daily. We then move from reasoning starting from the food waste, to proposals related to the space dedicated to the lunch activity.



Fig. 4. Experience class with Foodesign Lab

#### 4.2 WASTE, MEDIA, POLICIES & UNIVERSITY SOCIETIES <sup>2</sup>

Starting from the analysis of the relationship between waste, university campus and sustainability, the module has worked on the development and testing of some fictional scenarios useful to raise awareness in the university community in the implementation of

good practices of disposal.

The immediate focus was on the analysis of communication related to the issue of waste, starting from the investigation of the practices adopted within the universities, to the exploration of techniques useful to analyze texts, articles and content present on social media. All with the aim also to learn about the differences between news and fake news. This competence is becoming increasingly important nowadays, given a large number of sources and communication tools at our service.

The visit to the waste-to-energy plant of the City of Turin and the collaboration with the Turin start-up Quaerys offered students useful tools to approach the topic from different points of view. The concepts developed by the students see a predilection for the world of communication, leveraging the possibility to inform and educate subjects in the implementation of good practices. Videos designed for social media (see Fig. 5) as well as prototypes of mobile applications strongly characterized by gamification elements, try to propose new ways to address the issue of waste and easily involve even more people.

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<sup>2</sup> “Waste, media, policies & university societies” involved Debora Fino, Giuseppe Tipaldo, Fabio Bruno, Nicola Miraglio, Barbara Stabellini, Paolo Tamborrini.

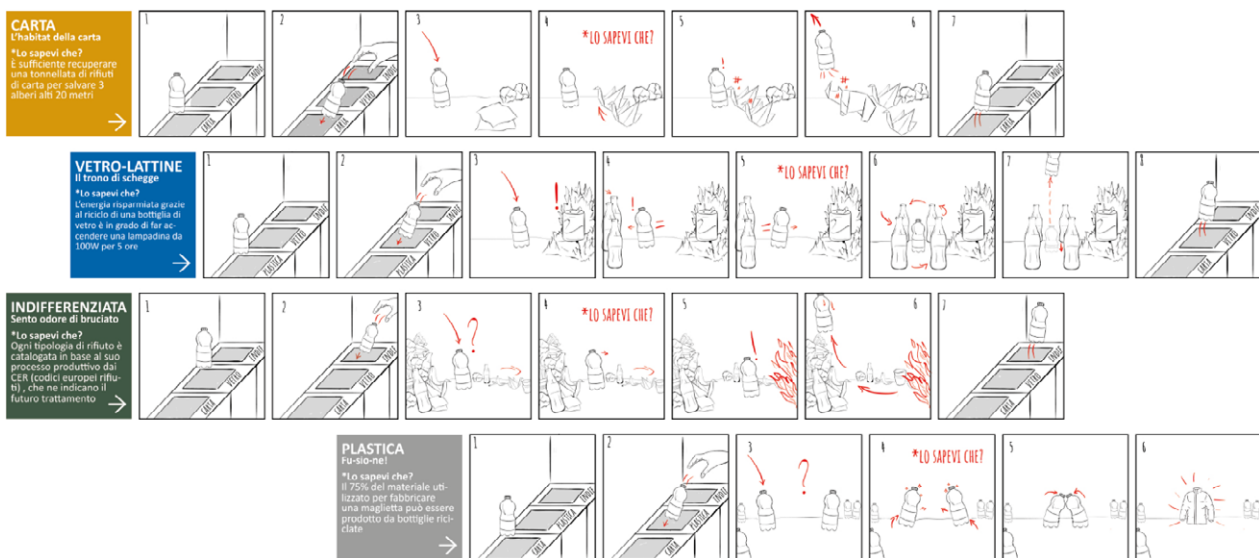


Fig. 5. Storyboard of communication videos on topic waste

## 5. CONCLUSION AND FUTURE WORK

These results were possible only thanks to the cross-fertilization that was created within the laboratories involved, where different disciplines have each found their own space of action offering the skills in which each is an expert, but according to a more design-oriented approach. An approach that is increasingly spreading even to disciplines far from design, more scientific and engineering.

What we want to show in the contribution is how the cross-fertilization that can occur in a polytechnical context could be useful for the development of more complex and full projects. We also want to focus on how the discipline of design can become a tool not only for the design of new products, services or communications but also a fundamental tool to mediate the knowledge involved, integrating the different skills and increasing the effects.

The results confirm how didactics can also be delivered in ways that go beyond traditional frontal lessons, considering experiential learning

dynamics and other innovative forms such as flipped classrooms, problem-setting/solving activities and multidisciplinary group design. The projects of all six workshops were exhibited in the framework of the Circonomia event, an event on the themes of the circular economy held on 4 and 5 June 2019 and included in the schedule of the Festival of Sustainable Development. During this event the results have been evaluated by the students through the expression of a preference each and the result has determined the first position for the workshop “Mens Sana: projects around food”, and the second position for the workshop “Waste, media, policies & university societies”, demonstrating how a design process and a more communicative result can bring together issues sometimes of little interest or distant from the topics of the discipline of study. Satisfied with the results obtained, the same methods will be repeated this year, where, however, the focus on Agenda 2030 will be even greater as the issues will no longer arise from the topics of interest of the University Green Team, but will specifically concern the 17 Sustainable Development Goals, with the aim of developing concepts and proposals in the short term to achieve the goal set.

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