

# INTED **2016**

10th International  
Technology, Education and  
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7-9 March, 2016  
Valencia (Spain)

# CONFERENCE PROCEEDINGS



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# NEW PERSPECTIVES FOR AN OPEN AND PEER EDUCATIONAL MODEL IN DESIGN FIELD: THE CO.META PROJECT

Venanzio Arquilla<sup>1</sup>, Giuliano Simonelli<sup>1</sup>, Davide Genco<sup>2</sup>, Fabio Guaricci<sup>3</sup>

<sup>1</sup> Politecnico di Milano - Dipartimento di Design (ITALY)

<sup>2</sup> Senior UX Designer – VISup (ITALY)

<sup>3</sup> Senior Toy Designer – TOY Design (ITALY)

## Abstract

More and more often we assist to a shift from a knowledge-exchange model, from teacher to students, to a more peer educational model, where a real specific problem is set as a goal of the learning process. The use of virtual environments allows all the actors, either students or teachers or partners to be involved in the generation of common knowledge in a collaborative arena where new skills and new methodologies arise for the use of all peers in order to increase awareness and defining solutions that really matter for the problem. From open resources to entirely open learning models, e.g. MOOC and open universities, today are becoming paradigms to create social and environmental innovation.

Peer and Open Education is spreading as effective way for students to overcome not only problems with *obtaining accurate information*, at the same time developing skills on *discerning how to judge the accuracy of the information they receive* in the Internet era, but also to make the educational, and consequently the learning, process become self-motivated from the fact of being a chance to impact on real complex problems of life.

This paper describes the specific case of the “Co.Meta” Lab, a didactical model born from the collaboration between the Design School of the Politecnico di Milano and a Charity Foundation - Fondazione Trentina per l'Autismo.

A complex socially relevant problem-goal, improving the quality of life for people with Autism, was introduced as the core of the learning process. The initiative was called Co.Meta - by merging the concepts of “Cooperation” and “meta-design” and was the opportunity to experiment a design teaching approach that brought self-motivation from students in learning tools and methodologies. Design operated widely into daily issues for autistic people bridging the gap between the consciousness about design responsibility and new perspectives for the future young design professionals.

Since 2012 the course focusses on the generation of product-system projects. Students have designed several concepts for brand new products from games to therapy supplies to disability devices. The recipients are patients, relatives and care givers, all gravitating around Autism, an unsolved and little-studied pathology implying huge complexity and a deep social impact.

The designing process is supported by an online blog, that serves as instrument for knowledge management and as communication and networking tool. Autism is a multi-faceted and complex issue that requires access to wide and specific information, a kind of research that normally would not be possible time-wise. From networking the research we allowed the cooperation among teams happen and this led to the creation of shared knowledge among students and with the Foundation, in a fully open source perspective. Psychologists, therapists and educational trainers were also involved to give their support, either in the classroom or online, allowing students to better address the field of interest and giving proof of the multidisciplinary perspective of the design practice. It actually was also an opportunity of networking, many other initiatives started from the collaboration on the activities.

The peer and open education approach is today a new model that in this case has been applied to design teaching, creating new value both for the public institution and for the society, while generating and testing new tools for cooperative learning for the future young designers.

## 1 INTRODUCTION

This paper describes an experimental didactical model born from the use of contemporary communication technologies that allowed the collaboration among different bodies: teachers of the Design School of the Politecnico di Milano, its students, a Nonprofit Foundation (Fondazione Trentina per l'Autismo) and a pool of therapists and centers for Autism. Today new technologies allow the didacti-

cal practice to experience new approaches to education. From MOOC to Open Universities the didactical scenario is spread and varies from the classical teacher-to-students approach to teaching models where methodologies are not seen as something that have to be transferred but they rather arise from the field research around a practical problem [1] [2] The problem-based approach takes inspiration from problem-solving practices of nowadays [3]. From Google to Yahoo Answers many are the online tools expressively developed to answer practical problems by gathering informations around the web and/or linking to thematic blogs where contributions are developed, gathered and collected. These aggregators of knowledge index informations based on algorithms that prize traffic generation rather than quality and accuracy of information. This is why, in order to establish a didactical model embodying online procedures, it is necessary to support students in the development of decoding skills to identify and classify quality information found around the web. This information has then to be oriented to the design goals building new layers of original content, coherently with an holistic vision of the design discipline, then transferred into a virtual yet monitored container where data can be visualized, shared, discussed and validated along with involved actors. This approach allows also to spread and multiply sources of information without the risk to go “off the track” and also in an exponentially growing fashion creating a “digital knowledge” referenced repository.

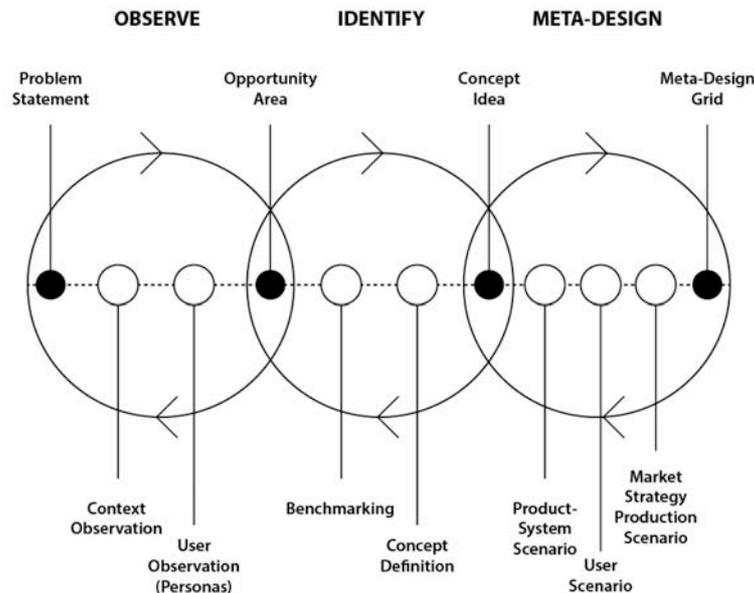
## 2 THE CONTEXT

The basis of “openness” of the society has been firstly introduced by Karl Popper [4]. He intended to point out that more and more society is open to intervention from others and, not less important, that the result of this could be an admission of “not completion” and therefore the need to take care of itself, of its abilities, not yet fully explored nor realized, to improve its welfare. Openness is the precious and fragile product of a society that wants to be brave and take over its destiny. Contemporary sociologists consider Globalization as one among the main phenomena that influenced the economical crisis, the wearing off of the welfare state and the shift of citizens into consumers. One of those, Zygmunt Bauman [5], describes today's society as a restless swarm, a “Liquid” matter, where there are no strong values or dogmas for reference and nevertheless there is the need to cope with problems starting from an individual base in a collaborative fashion. Therefore technological tools seems to be the very best ones to put this recipe for solving the problems on a collaborative basis in practice. From online communities to social networks, from video conferencing to group chats, today's communication has improved exponentially and allows us to realtime interact and exchange directions and opinions. [1] Technology is also what drives internet, today's biggest container of information. In it information is clustered often with main thematic criteria, which is very helpful from the point of view of the organization. Nevertheless to find this information is not always an easy job. First of all search engines are programmed with algorithms pricing massively traffic rates rather than typology of information (e.g. news, scientific, reviews, etc..). Secondly accuracy of information is the other great problem, because internet is structured as a huge hyper-text where everything is connected with each other and verify all the sources can be a very difficult task. This often is why virtual communities are born: specific users overlooking specific information. Here is where the principle of openness finds its virtual correspondence.

## 3 THE ACTIVITIES

The scheme below shows the order of the activities that have characterized this educational experience from the creation of an open knowledge repository to the promotion of design results. Fischer and Giaccardi defined Meta-design as *an emerging conceptual framework aimed at defining and creating social and technical infrastructures in which new forms of collaborative design can take place*. [6] This is why it is a valuable tool to conceive products and services in a design-driven approach where collaborative dynamics can take place. Social issues are a great force in MOOC educational frames because it allows to create high quality and relevant opportunities to interact and collaborate so students see the value in engaging with their peers. [7] [1] These design-related tools for achieving cooperation are practical and qualitative. The same Fischer and Giaccardi describe the challenge of design as *not a matter of getting rid of the emergent, but rather of including it and making it an opportunity for more creative and more adequate solutions to problems*. [6] The strength of a meta-design approach to problem-solving is to develop and explore the unthinkable possibilities arising from collaborative and multi-disciplinary frameworks where designers can operate. As living systems work, this holistic approach aims at the improvement of the way people feeds, clothes, shelters, assembles, communicates and live together. The Meta-design course has always been a critical step in the educational process at Design Faculty of Politecnico di Milano. Here theory and practice meet to transfer to stu-

dents methodologies and approaches to be employed in the professional activity of tomorrow. In our vision [8] the output of the course is not a specific product or service but rather a process of thinking that leads to the definition of a concept or brief where many product or service ideas can be found just from the application of diverse styles, materials or technologies. Meta-design comes before design and allows to build a set of elements that matter that can influence the product in relation to the user or the context (technological, social or market).



A design-driven process for new product development considers meta-design as today the very best tool to create new business opportunities within a strategic frame that leads to the creation of new product service-systems. Autism spectrum disorder (ASD) is not an easy-to-detect disease, a developmental disability that causes significant social, communication and behavioral challenges as for patients as for caregivers and parents. Numbers tell us that it is spreading with a fast pace (1 child every 68 born in USA) and it lasts all-life long. People with autism communicate, interact, behave and learn in ways that are different from most other people. This is why design can have a role in the improvement of the quality of life, trying to develop innovative solutions to stimulate thinking and problem-solving abilities in order to gain autonomy step by step. The range of possibilities is wide and ASD changes from one subject to one another, from gifted to severely challenged. Among areas where design can play a role is on the exploration of alternative ways for the communication of emotions and needs as well as helping in creating ways to decode a too complex reality to a more forecastable one through the use of visual structure of day-time and tasks to perform. Failing in making reality comfortable and/or understandable leads to physical isolation, violence (on others and on themselves) and stereotyped and repetitive behaviors, cutting any relationship with others off. There are a few examples of relating design with ASD: when discussing how the environment can provide a prosthetic support for functional performance in rehabilitation practice, researchers Rachna Khare and Abir Mullick defined how to properly make user observation and to gather design requirements [9]; on the other hand, a team made of scientists from Georgia Institute of Technology, University of Valencia and Politecnico di Milano conducted several tests by designing motion-based activities to enhance people with Autism's capability of interacting each other in a public context [10]. Some interesting case studies of design applied to Autism included a remarkable range of opportunities such like: interior design (i.e. Enter Architecture's interior project for a Medical Center for Autistic Children in Sydney), fashion design (WEIGHTED COMPRESSION VEST, a series of clothes designed to calm down), chairs and toys (the relaxing Sensory Chair, the toy Auti aimed at enhancing communication and emotional understanding) [11]. From those examples we have decided to start this challenge: to bring this very specific problem into the educational process, assisting in fact to a reinforcement of motivation in students just while making use of elements that arose from the research useful for the meta-design process:

### 3.1 Observe

The Problem statement has been explored through:

- Context Analysis – students have submitted far more posts than the minimum requested, showing interest and commitment to the problem.
- User Analysis – direct observation of people with autism within real therapeutic facilities has been seriously accepted and felt as a privilege, even when reality was harder than what imagined.



### 3.2 Identify

The observation lead to the definition of an Opportunity Area where a wide range of Concept Ideas have been developed and discussed with teachers and therapists as well.



### 3.3 Meta-design

Selected ConceptIdeas have been further developed creating a meta-design Concept, composed of a Product-System Scenario, a User Scenario and an Enterprise/Production Scenario. Co.Meta’s main purpose is to make students aware of the social usefulness of design. This is why the first editions focussed the learning process on environmental themes, and soon on ethical ones, establishing also a partnership with POLI.social, the program of social responsibility of Politecnico di Milano. The course is structured in several modules and activities:

## 4 EX CATHEDRA LECTURES AND INTERACTIVE SEMINARS WITH THERAPISTS AND OTHER GUESTS

The “Co.Meta for Autism” edition came after a first edition (2012-2013) focussed on the generation of product-system projects using primarily wooden production waste coming from companies already financing a social cooperative. In that case, the students designed several concepts for brand new products to put on the market: the sale of products would have supported the activities and the services of the cooperative itself. Since the second edition (2013-2014), the design efforts were specifically aimed at improving the quality of life of people with this disease (ASD). The partnership with

Trentino Autism Foundation (FTA - Fondazione Trentina per l'Autismo) gave us a first therapeutic framework in which both students and teachers became to create shared knowledge. In order to give students a real feel of the disease we implemented a program of ex cathedra lectures and interactive seminars with therapists and other guests. We could count on the partnership with real actors of the therapeutic context, such as “Fondazione Piatti” and “Cooperativa Sociale Spazio Aperto Servizi” among others, which allowed students to visit their dedicated centers in order to directly make user and space observation and gather information from actual stakeholders. Due to its social purposes, Co.Meta has been also partnered by POLIsocial, the program of social responsibility of Politecnico di Milano. This program marks a new way to build and apply knowledge and academic efforts by combining social engagement with the two traditional pillars of academic activity: teaching and research. It also aims to place the university in close contact with the dynamics of change in society, extending the university’s mission to social issues and needs that arise from the territory, on both a local and global level. [12] The activities of Co.Meta were then tuned and carried out in the different phases of the design process since the second edition of Co.meta activities were structured as following:

#### **4.1 Warm-up**

The first meeting with students gave the opportunity to introduce the class to the main topic of the course, whose challenge consisted in facing very atypical users in a high social value context, and to present the activities of FTA. Students were asked to form groups of three/fours members each, which would have represented their team along the whole Co.Meta experience. A “warm-up” exercise was launched in order to allow the groups to get familiar with Autism and its implications on affected individuals: the class was asked to spend the following week searching for any kind of resource related to the state of the art about the pathology: links, surveys, essays, articles, interviews, case studies, healthcare products, profit and nonprofit associations, even movies and fictional works. All those sources would have depicted the scenario the groups would have designed for. Precious information was acquired, changing some stereotyped assumptions about the disease and disclosing unexpected design opportunities: for example, the documentary “The Special Need” narrating how the dynamics of love and sex impact on such people, or articles about the first man with Autism who succeeded in graduating. Students posted all search results on the blog of the course so that during the week the professors were able to monitor in real time the activity of the class. Technology represented a useful tool during this phase, making the learning process transparent: after only one week, the blog counted almost 150 posts and had already become a shared knowledge platform where both students, professors, partners and interested guest visitors could access to read useful information about the world of Autism. The warm-up exercise represented a propaedeutic way for quickly making the students aware of the assigned topic and of the peculiarities, needs, behaviors and expectations of the end users. This exercise allowed Product Design students to become familiar with online tools, in order to: improve their storytelling ability by adopting contemporary open source tools that a few of them already knew, such as the Wordpress CMS that are free of charge yet seldom used for educational purposes in design. Also they experienced the value of open and shared knowledge by personally contributing to the creation of an open repository which reduced learning gaps, multiplied the information and enabled the ideas exchange, also avoiding duplicates and enhancing the interaction on the single posts. On this purpose a “blog guide” was edited and shared with students, allowing year by year also to improve the platform with SEO-friendly metacontents useful for indexing the blog and give visibility to the initiative. The blog of Co.Meta in fact has been conceived as a thematic portal where each student could contribute with any relevant founding on Autism, thus allowing not only other students to witness the activity of other groups but also involved actors, as institutional and medical partners of the project, to do so and interact with teachers and/or students. Meta-design characterizes activities, processes, and objectives to create new media and environments that allow users to act as designers and be creative.[13] The Peer and Open educational model practiced within the Co.Meta project has created a virtual hub where students become the publishers of articles in a blog around a specific theme. In order to increase touchpoints among actors (whether students, teachers, therapists, and public) also social networks, such as Facebook, have been included and integrated with the blog. In this way the students-generated content had also a different (and thematic) visibility and chance to be shared and diffused in the web. Every group of students has freedom to choose on which aspect to analyze the subject as long as it is relevant for Autism. This creates a knowledge that is wide and yet specific, allowing a global and holistic approach to the problem.



### 4.2.2 *User Observation*

At this point User Observation started to be a structured part of the work and was processed through the use of ethnographic methodologies. Students were enabled in doing field research in order to measure and verify their initial assumptions, going beyond stereotypes and focussing instead on archetypes - the so-called "personas". Personas are "archetypes built after a preceding exhaustive observation of the potential users. Each persona is based on a fictional character whose profile gathers up the features of an existing social group. In this way, the personas embrace the attributes of the groups they represent: from their social and demographic characteristics, to their own needs, desires, habits and cultural backgrounds" (source: [www.servicedesigntool.org](http://www.servicedesigntool.org)). Each persona will be analyzed and summarized in a table highlighting possibly realistic elements (products, spaces, materials, etc.), "sensorial" and "stylistic" features that the final product shall have in order to meet the persona's features.

## 4.3 **Second Exercise - IDENTIFY**

### 4.3.1 *Opportunity Area*

After the direct observation phase and after having made a research on similar areas, students had to state on one or more A3 format tables the Opportunity Area they choose, crossing Context Observation or the observation of spaces of the same typology with the User Observation. The scope of the observation will make possible an insight on the chosen area, in particular:

- usability implications, linked to ASD
- potential related to the Design Scope
- under-categories (if present)
- functional and stylistic trends related
- technological/constructive implications

This is a further step from the warm-up and is actually a kind of "declaration of intent" that defines the subject of the interest in the design for each group. A sort of filter on the whole possible world of possible products in order to limit the research and potential competition spectrum. The Opportunity Area had to be depicted by identifying a "functional group" linked to a specific need and to more than one product typology.

### 4.3.2 *Benchmarking*

Locating the Opportunity Area was the framework in which the concept will be developed. Then it will go in-depth in this phase of the research of specific products and services on the market. So this way the presence of specific or potentially operating companies in the specific area were checked / evaluated by defining a kind of map of the existing state of art of products / services and businesses. The main goal was the definition of a visual map tracking existing products and services and at the same time allowing the students to highlight the state of the art, the current trends, the behavioral models and the values lying behind those products. A specific format was developed to encourage students specialized in Product Design in improving their visual skills by adopting communication techniques such as infographics, maps and icons for necessarily synthesizing their research in a visual summary.



Young product designers are used to underestimate such soft skills that, if properly adopted, can add qualitative value to the whole process. Therefore, we asked students to explain the results of their analysis in 2 different formats: an A1 board illustrating the state of the art (the so-called “7x7 Situation Map” with at least 49 relevant products / projects) and an A3 board focussing on the design opportunity area learnt from the previous map.

Each “7x7 Situation Map” was a matrix made of 49 pictures describing the products found. The map might have been powered with infographics, keywords and titles aimed at applying a further qualitative filter to the search, in order to focus on a specific type, sector and/or peculiarity of products the group was interested in investigating.

The A3 board then should reveal the area of interest the students would have continued working on, by isolating a specific part of the matrix and justifying their choice. The first exercise provided the students a methodological approach for scouting the context, giving them a solid basis upon which starting the proper concept generation phase.

#### 4.3.3 Concept Idea

Each group was asked to develop at least three concept ideas, in order to allow the selection of the most promising ones together with the foundation / client. The selected concepts would have been the ones carried on until the end of the course.

In order to properly show the concept ideas, the students had to deliver:

- one or more sheets documenting details about the use or technical elements to highlight
- a sketchboard describing the concept evolution
- an A2 poster visualizing the concept using any visual technique, supported by an elevator pitch containing
  - a name of the concept idea
  - a sub-title to highlight cutting-edge features
  - a visualization (rendering or sketch) of the concept idea
  - a storyboard showing elements of originality and improvements they bring to life
  - references to the Personas and Style / Sensory elements



## 4.4 Final presentation - IMPLEMENT

The aim of the third and last exercise of the semester was to fully describe the product-system issues connected to the developed concepts. In order to methodologically face all the aspects, the groups were asked to follow an A1 grid provided by the professors, which was helpful for learning how each part of the product-system was strictly connected to another and for verifying the whole effectiveness of the design choices. In each of the 9 fields composing the grid, the students had to clearly define the following aspects:

### 4.4.1 First row: Product-system

**Context:** How the defined solution impacted the physical environment and the behaviour of the end users also accounting for possible barriers to entry. **Product- service-system elements:** Which product, service or communication design choices characterized the concept. **Communication:** Describing a potential communication strategy by highlighting ways and tools to realize it, such as the product/service name, brochures, packaging, websites...

### 4.4.2 Second row: the user

**Personas:** Resuming the studies on personas made in the second exercise to declare once more the needs and desires of the end users. **Ways of interaction:** How the users interacted with the product/service, step by step quite like an assembly manual. **Ergonomics:** A both physical and cognitive reflection about the relationship between the product and the end user. Also highlighting threats and opportunities in the chosen solution.

### 4.4.3 Third row: Enterprise, Strategy, Production

**Distribution - Packaging – Point of sales:** Identifying distribution channels and retail solutions, according to the previously defined personas. **Materials and finishing:** Sketches, keywords and schemes to visualize the main characteristics of the product. **Technology:** What is the technological context, its current and future trends and what are the ones applied to the product/service itself.

Beside this grid, the groups were also asked to sum up their concept in an A2 poster and support their statements by mentioning their sources. They also were encouraged to make a physical prototype to support their final presentation. Once more, the course paid a lot of attention to the communication aspects of the projects: visual skills were not meant as simple make-up tricks, but as a part of the project itself, able to increase its both inner - product-system approach - and outer - the way it is perceived - value. All contents were visualized using heterogeneous techniques such like sketches, pictures, renders, storyboards or maps. The professors set no ties, hence enabling students to choose the technique they knew best or which they considered most suitable to their storytelling, always being respectful of the assigned grid. The final works were then exhibited in the classroom and illustrated to entrepreneur and the partners. They were finally evaluated by their quality and completeness, their graphical output and by the impact of the oral pitch, coherently with the meta-design purposes of the course.

## 5 CONCLUSIONS

The Co.Meta experience defined an educational good practice ready to be replicated in the next years. We learned many lessons from the experience of these years. Among the others we want to point out some of them we think that are the newest and the most promising for this didactical model:

- Given that Autism is certainly a complex field to deal with for second year students of the design faculty, results have been fully adequate and heterogeneous. This is also because from a methodological perspective, meta-design does not define a product or specify an outcome, rather it defines and designs the conditions for a process of interaction. [16] So through the years projects developed include sectors as games, interiors, wearable, planning, sports, food, personal care, and have concerned technological/not technological solutions within private/public contexts for autonomous/assisted use. Within the frame of Autism, where there are no determined and universal therapies but rather different points of view, there was no strictly medical objective in the design practice. There was a bottom-up approach starting from the awareness that often quality of products, spaces and practices can have a major role in the support and improvement of life for those people. Often unusual yet valuable design solutions arose from the exploration of this complex theme. And this was possible thanks to the way the problem has been approached and the bravery of taking different paths, even though there is no direct involvement in the problem but yet motivated enough to try to make the difference.
- The problem-based approach to education let students deal with this complex theme. We had exceptional cases of first rejection in the beginning but this was the trigger for participation and a better understanding of the potential of methodologies and tools proposed. [7] [1]
- The use of new technologies and a P2P approach to education granted students new skills, more contemporary answers (both in ways and contents) and new ways of learning. The building of a participatory and collective form of education allowed to surpass the problem of making students aware enough of this complex disease in short time and rather stay on behavioral issues rather than strictly medical ones. All the groups of students used the blog to post more material than we asked for, indexing contents, commenting other posts and using this process to keep learning. So did the teaching staff, that through these posts could widen its knowledge about ASD in an Open and Peer learning process. [15]
- This approach, used in the didactic, opened to new research possibilities and let year by year the course to be renewed constantly, thus being stimulating also for the teaching staff. The teaching model has been improved from the “beta” stage of the first editions. For example, the research field of the last edition has narrowed the scope to the specific sector of furniture; it involved stakeholders in a more structured and organized way, enhancing the impact of user observation phase, motivation and thus the quality of the research. [7] [1] [3] [8]
- It enabled positive knowledge exchange circuit between all the stakeholders around the project in a structured way. We gave methodological support to young professionals (Millennials / Generation Y / Echo Boomers) that often underestimate (or take for granted) the issue of evaluating the quality of information available over the internet. We also had the opportunity to underline the importance of different actions in this sense. First of all, to keep track of researches, that means also to make a different use of social networks in a professional view. Thanks to the use of these environments we enabled students to engage in informed participation rather than being restricted by the use of existing systems [17]. A few students actually know how to upload and edit contents on a Wordpress blog while many of them do use Facebook groups to comment courses, teachers, and so on.. but they do not make a scientific use of them. Secondly, but not less important, students have learned to cluster the different information (through the use of categories and tags) and quote authors. In the era of “cut and paste” we think this is a very good result for the education of future professionals.
- Finally, the Co.Meta experience represented an effective action-research based teaching model. On one hand, it allowed design students to assimilate topics such as Social Economy, Social Sustainability and Social Innovation, which are becoming more and more unavoidable requirements for all those future designers aiming at transforming the world they live in through smart new products and services. On the other hand, it gave teachers an opportunity to better understand the context, to define new research hypotheses through using teaching for reflecting on “meta-design” and to try turning the achieved results of the course into effective applied research projects. This new setting for the teaching of the design discipline has employed renown tools and methodologies (meta-design approach) transferring and applying them to a social

problem, thus amplifying its overall value with a humble yet cutting-edge approach that looked at a specific problem (treatment and improvement of the quality of life for Autistic people) on a different perspective. [6] [13] [17] [16]

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