An Example of Innovative University Teaching and Learning: the Fashion-Tech Model of Integration

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Abstract

The aim of the paper is to investigate the relationship between higher education institutions and companies in the field of Fashion-Tech educational system, in order to test the effectiveness of the integration of heterogeneous skills and disciplines. The paper firstly analyses how design, pervaded by the results of technological progress, has become over time an increasingly complex and multidisciplinary field, determining the need and development of new professional figures. Secondly, it focuses on the fashion-tech sector, the resulting area obtained from the intersection of fashion design and digital technologies, highlighting the need for a reviewed educational approach to form hybrid professional figures. To this aim the paper examines data obtained through interviews and desk research conducted within the framework of "Education for Fashion-Tech: Interdisciplinary Curriculum for Fashion in the Digital Era" European project, outlining the state of the art in fashion-tech and investigating the transversal dynamics between the academic world and companies. Next, a case study is reported: an international and multidisciplinary workshop carried out in the field of academic training with the collaboration of a company. What emerged from the experience is that in the Fashion-Tech, the close and continuous relationship with companies acquires a fundamental role.

Keywords: Fashion-tech; design; hybrid professionals; multidisciplinary workshop.

1. Introduction

The field of design is becoming more and more complex. Today's context challenges young designers to perform in an increasingly interdisciplinary and cross-fertilized environment, characterized by fluid and constantly changing methodologies (Testa, 2019). Especially with the advent of digital technologies and with the increase in design experiments around them, the act of hybridizing with different contexts is increasingly required in design research, education and practice. This would lead to outline a professional figure that can mediate within the design process, serving as a middle ground between art, engineering, design and critical thinking. Speaking of hybrid design implies confirming that the same boundaries among the different types of design are continuously dissolving (Bremner & Rodgers, 2013).

The growing hybridization of contexts does not only involve the definition of a professional figure, but also competes with the educational methodologies that can be constructed to define this new type of designer (Bremner & Rodgers, 2013). We can affirm the need for a urgency in redefining the patterns that make up design education.

The multidisciplinary that the Fashion-Tech environment constitutes forces the need to encourage an integration among different disciplines. This would create a fertile and cross-fertilized ground for design. Furthermore, it is also clear that, in this hybridized field, research and training should consequently have a practical and applicative feedback, to test its effectiveness and the interest that companies may have in specific design research.

Therefore, in the market application as well as in teaching, theory and practice of design cannot be split, but rather encouraged. To quote Boyer, "Theory surely leads to practice. But practice also leads to theory. And teaching, at its best, shapes both research and practice." (Boyer, 1990, p. 16) In detail, for Fashion-Tech, technologies have officially penetrated the mass market and are the result of a mixture of tools and methods from different sectors and disciplines (Tenuta, 2020). It is therefore necessary to revise the tools of investigation, not only for academic research, but also for applied research, through a redefinition of the design methodology that allows to connect and combine the processes of design with those of IT, thinning the boundaries between creativity and scientific method (Tenuta & Testa, 2018) as well as a definition of the characteristics of those professional figures that will populate the world of Fashion-Tech.

2. Fashion-Tech: from HEIs to Companies

In a changing landscape, the result of strictly enforced quarantines and social estrangement, fashion players have been forced to accelerate strategies that were at the testing stage only months ago into new operational realities. Some technologies that had been slow to catch on such as virtual catwalks and digital showrooms, sample signatures in sourcing offices,

livestream commerce and the latest 3D design tools, have accelerated dramatically (Business of Fashion, 2020).

The technologies and processes successfully implemented during the crisis will have a profound effect on the future of the industry, a future in which the grafts between fashion and technology have been around for the last years but have only recently taken hold.

The talents of the future have to be ready for all this, prepared to meet the needs of companies. It is precisely with a view to training professionals capable of handling the subject of fashion technologies that Politecnico di Milano has been investigating effective teaching and learning methodologies in the field of Fashion-Tech for years. In detail "Education for Fashion-Tech: Interdisciplinary Curriculum for Fashion in the Digital Era", a three-year (2017-2020) Strategic Partnerships for higher education project co-founded by the Erasmus+ Programme of the European Union (GA 2017-1-SE01-KA203-034601), had the aim to bridge the fashion field with that of innovative technologies by creating new training pathways to improve the level of key competencies and skills of students and trainers and to break down barriers between technologists and creative communities and build meaningful collaborations.

A project that does not remain closed only in the academic culture but that, throughout its duration, has been enriched by dialogues with the market. From the outset, the project was oriented towards an observation that included not only research but also industry. Indeed, the initial desk research entailed researching higher education institutes (HEIs), research centres (RCs) and companies in Europe and worldwide in order to identify the ones active in the areas of wearables, smart textiles or digital manufacturing.

Additionally, the goal was to identify best practices and current and/or upcoming trends in the Fashion-Tech field. Thus, the structure, teams, products and methodologies of the identified practitioners were explored in order to understand educational and research approaches to the area of Fashion-Tech. The initial research concluded in 60 HEIs, 57 RCs and 171 companies (total of 288) globally, all working within the Fashion-Tech area. The state of art of higher education programmes was of interest, along with high-qualitative didactic experiences and applied research experiences by public or private research centres or companies. The institutions were contacted through email and personal contacts and 14 HEIs, 13 RCs and 27 companies globally showed interest in being involved with the project.

The results of this analysis were useful for two main points: there are many different fragmented realities that are defining a shared methodology, defining the features of a new hybrid figure that is able to control the different phases of the methodology and to connect the dots between the different professional figures that we will encompass later, by ensuring that shared tools for knowledge are defined; as for the collaborations, all the interviewed realities claim to be very attentive to collaborations or to have the intention to improve them

(12/14 universities, 21/26 companies and 12/13 research centres have collaborations in progress with companies).

2.1. "IAMlight" Experience

Starting from the results summarised in the previous chapter, the "IAMlight" workshop was designed with the aim of encouraging the meeting of different disciplines, testing a trans-disciplinary methodology based on a scientific method and a creative process for Fashion-Tech (Tenuta & Testa, 2018) and encouraging relationships with industries. "IAMlight" is one of five pilot workshops organized during the 3-years E4FT project with the aim to test and evaluate different approaches to Fashion-Tech. During the pilot workshops, the monitoring process was aimed to assess the overall quality and success of each delivered training program. Central to this process it was the use of evaluation forms and questionnaires that the participants completed before and/or after each workshop.

The methods were designed to provide accurate feedback and assessment relating to the depth and quality of the material delivered, the relevance of the subject matter, and the teaching practices employed throughout the intensive teaching and learning period. In addition, a peer observation process was adopted: it offers critical insights into an instructor's performance and complements the student ratings and feedback forms, combining both perspectives contributed toward a more comprehensive and accurate representation of the overall teaching quality.

Lastly, informal group discussions were held at the end of each workshop to openly discuss and collect any additional areas or matters that they wish to raise or express, which may not be best achieved using feedback forms or questionnaires. An in-depth analysis of the "IAMlight" workshop's learning, teaching and training experience follows.

2.2. "IAMlight", Experiencing Additive Manufacturing at Politecnico di Milano

The "IAMlight" workshop for higher education learners was organised by Politecnico di Milano (Project Leader) at Polifactory, the official makerspace and FabLab of Politecnico di Milano, from the 24th to 28th June 2019.

It aims to: test the designed curriculum's pedagogy and teachers' toolkit in real settings; engage learners in an intensive transnational, multicultural and interdisciplinary collaboration, to test not only their technical abilities but also their interpersonal skills; facilitate learners' ability to divergently personalise their learning within the fashion-tech fields thanks to the use of blended tools and on-field activities; prototype and evaluate the quality of possible outputs as Fashion-Tech artefacts too, then, approve methodology and promote it beyond the partnership and into the European communities of HEIs, companies and shareholders; highlight the further learning, teaching, and training opportunities based on the emerging needs of trainers and learners on the field.

In order to achieve these objectives, a specific brief was designed together with a company in order to break out of the academic dimension and design objects that would also consider the market and not only experimentation. The project brief was to design a jewellery piece for Maison203 using 3D printing technique. A design concept that starts from the perception of surfaces depending on the presence or absence of light.

As mentioned, the integration of different fields and competences was one of the main point of the project. That is why the actors involved were many and heterogeneous: 1 company: Orlando Fernandez Flores, Maison203; 5 Politecnico di Milano staff members from fashion and tech field, 2 (1 fashion 1 tech) with the role of trainers: Chiara Colombi, Patrizia Bolzan, Chiara di Lodovico, Livia Tenuta, Susanna Testa; 3 keynotes speakers with the role of expert trainers offering specialised contents to supporting trainers and learners' activities: Daria Casciani, Sara Colombo, Silvia Deborah Ferraris; 5 learners from London College of Fashion, 6 from Politecnico di Milano and 4 from the Swedish School of Textiles – University of Borås selected through a call for students, for a total of 15 students, grouped in 5 teams of 3 students, one student forms each partner, to maximise the benefits of an international collaborative experience.

2.3. Methodology

The project – organized in 5 days as shown in Figure 1 - envisaged a learning-by-doing part which was compounded by theoretical lessons imparted by experts in digital manufacturing and 3D printing, fashion and jewellery design, Fashion-Tech and communication design.

These supported the whole design process and guided the students through all of its stages. About the research methodology, a qualitative analysis from observation and a quantitative result through interviews and questionnaire were conducted during the different stages of the workshop. Below is an outline of the workshop meetings, with the specifications of the experts and the disciplines involved.
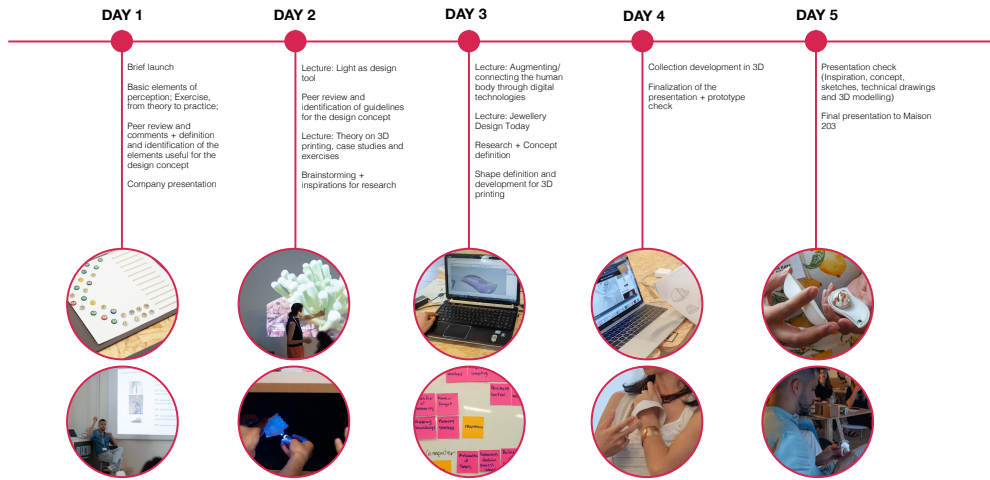
DAY 1

Brief launch

Basic elements of perception; Exercise, from theory to practice;

Peer review and comments + definition and identification of the elements useful for the design concept

Company presentation

DAY 2

Lecture: Light as design tool

Peer review and identification of guidelines for the design concept

Lecture: Theory on 3D printing, case studies and exercises

Brainstorming + inspirations for research

DAY 3

Lecture: Augmenting/ connecting the human body through digital technologies

Lecture: Jewellery Design Today

Research + Concept definition

Shape definition and development for 3D printing

DAY 4

Collection development in 3D

Finalization of the presentation + prototype check

DAY 5

Presentation check (Inspiration, concept, sketches, technical drawings and 3D modelling)

Final presentation to Maison 203

Figure 1. IAMlight Workshop Calendar. Source: Colombi & Tenuta (2020).

2.4. Results

As mentioned, a qualitative analysis from observation and a quantitative result through interviews and questionnaire were conducted during the different stages of the workshop. About the qualitative analysis, the intensive study programme produced 5 new Fashion-Tech product concepts, delivered with a physical prototype, addressing specific market opportunities in term of product-service, interaction with the users and supply chain management. The groups were asked to produce a presentation including research, concept, sketches, technical specifications and pictures of the prototype/mock-up. The products designed and prototyped by the various groups envisaged very diverse scenarios for the use of 3D printing and embedding light. Each group was able to develop the project brief taking into account the technical limitations that the applied technologies required. Furthermore, the collaboration with the company led the participants to develop a project suited to the aesthetic lines of the brand as well as to consider the industrial production of the object.

The initial exercises on the behavior of light applied to 3D printing had been used by the groups as a starting point for the project development. About the quantitative analysis, specific questions were included in the questionnaire, which were submitted to the students at the end of the course. The aim was to evaluate both the degree of satisfaction about the management and conduct of the workshop, both the improvement of the individual skills of each participant.

The program was considered coherent with the Fashion-Tech theme by 90% of the participants. This is demonstrated by the fact that the level of satisfaction for the entire programme, the structure and the organization was very high: 80% of the participants found

the information pack and programme extremely clear and 90% of them considered the FabLab a suitable place for the workshop.

The questionnaire also revealed the limits and opportunities that the participants described in relation to the teaching experience. In particular, among the opportunities identified, the importance of the union between theory and practice, the multidisciplinary of the experience and the possibility of working in a heterogeneous group in terms of knowledge, skills and cultural background was highlighted.

Furthermore, the opportunity was found to be able to collaborate on the one hand with experts of the Fashion-Tech sector, learning from their skills and challenging themselves with their knowledge inputs, and on the other hand to cooperate with a company thus having a real stimulus and feedback from a productive reality. Finally, the workshop was defined as a good simulation of a design reality.

The limitations that emerged from the questionnaire mainly concerned the time available, in particular that relating to the improvement of 3D modelling skills, the teaching of technicalities regarding light and practical experimentation with machines. In particular, the use of Rhinoceros 3D as a three-dimensional modelling software was described as essential, a skill that 60% of the participants stated they would have been able to develop more with more time at their disposal. In addition, 2 out of 5 groups have suffered from a lesser interdisciplinarity within the working group: they would have preferred a group built with a fashion/jewellery designer working together with a product designer/architect or even a (mechanical) engineering or electronic student etc.

The suggestions that emerged ranged from the implementation of the technical knowledge of 3D software to the desire to have further experimentation with experts in the field of electronics such as circuit integration as well as programming with a microcontroller.

Finally, it was asked what was the most important lesson learned from the workshop and it emerged that the 70% of the participants understood the contribution that the designer can make in the field of Fashion-Tech, the urgency to change the education curriculum, the importance of communication skills in group work and the need to capture and satisfy consumer's demand.

3. Conclusion

"IAMlight" workshop was useful to test the actual application of an innovative educational curriculum model in the field of Fashion-Tech, including a collaboration with a company. Participants were interested in learning and experimenting new approaches to the discipline.

The short course was structured in order to prepare students for the industry: the teaching aimed not only to address technical aspects but also to enable the development of

transferrable soft skills, such as teamwork, communication, critical thinking and problem formulation and solving, among others. Each module was well balanced between frontal lessons and learning-by-doing parts, giving a continuous stimulus to experimentation and learning of the discipline.

Although the overall evaluation of the experience is to be considered more than positive, the limited time available left some didactic gaps both for the technical part (understanding of 3D printing and electronic technologies) and for the material experimentation (printing tests and correction of the prototype). This underlines the importance of the designers' curricula being implemented with multidisciplinary collaborations to bridge any technical gaps.

Moreover what emerged from the experience, and in particular, from the learning by doing part, is that in the Fashion-Tech sector, the close and continuous relationship with companies acquires a fundamental role.

It allows universities to be aware of what the challenges are for the market. It is not a matter of knowing the technical challenges of a company, which are circumstantial and short-lived, but instead of entering into what are the most complex discourses, which invest different aspects of the world of design and involve various disciplines.

This synergy allows to find answers to bridge the gap between traditional design and new technologies that help make the industry more sustainable, forward-looking and effective. It allows universities to learn about the state of technological development.

This becomes a fundamental element to design according to available technologies, stimulating further developments, but starting from a certain basis. It allows to monitor the market and understand the actual demands of consumers. This is possible thanks to a constant comparison with the marketing areas of the companies that capture the requests and preferences of consumers. It allows to train professionals capable of responding to the challenges of the market, increase the employability and innovation potential of students.

Companies today are no longer interested only in internships or recruiting graduate talent, but want to develop relationships with students while they study, to be close to the talent pool.

The "Education for Fashion-Tech: Interdisciplinary Curriculum for Fashion in the Digital Era" project focused mainly on Higher Education Institutions, the following step is the one to create a stronger connection with industry. Precisely with the aim of increasing the link and dialogue between universities and companies, another European project has been launched: FTAlliance (GA 612662-EPP-1-2019-1-IT-EPPKA2-KA).

The consortium comprises 13 partners (12 full + 1 associate) including higher education institutions, research organisations and small, medium and large enterprises. To improve cooperation between industrial, research and educational institutions on a European scale,

multidisciplinary skills and resources are needed to implement innovative educational models. FTAlliance is an international industry-university educational alliance designed to enable mutual learning from different research, education and industry experiences, to exchange know-how and build an open innovation model to promote cooperation and fuel the competitive growth of the Fashion-Tech market.

The ambition of FTAlliance requires a major collaborative effort by pooling and sharing know-how and resources. Cooperation between universities and businesses at European level is needed to improve the skills and capabilities of fashion and textile designers to compete internationally.

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