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Textile and Fashion Design Education for Sustainability Practice

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ABSTRACT

The growing trend towards sustainable and ethically designed textile and clothing is not only helping to create a greener planet, it also created a whole new job market. The sustainable design being part of the education process may give us a considerable edge in the industry, while learning to incorporate sustainable practices at process inception will add both a competitive advantage and encourage eco-design.

In this study we will present a series of sustainable design projects to develop the capabilities of students in textile and fashion design to be future generators of sustainable value for business and for the society.

INTRODUCTION

In the past few years, sustainable design has gained more and more importance. Our clothing consumption has reached an all-time high, and in response, advocates for mindful, eco-friendlier design are screaming their message louder than ever. And it seems the fashion industry is finally listening: More and more fashion brands have committed to going toxic-free.

Thus as the demand for more sustainable and ethically designed clothing increases among consumers, so too does the demand for designers trained in those fields.

In textile and fashion field, one of the factors permitting to enhance this new tendency and need is to incorporate into the academic activities the value of eco-design and sustainability, especially for textile and fashion designer education to respond to the Principles for Responsible Management Education (PRME) of the United Nations Global by incorporating the concept of environmental responsibility into the education that will play a key role in the evolution of society towards sustainability [1].

The education space is one of the greatest places to initiate and develop the changes that we need in the world. Education for sustainability applied to textile and fashion gives us ways to explore, test out, visualise what we might be, who we are as citizens and to wear our values for each other to see.

In this context, some researchers introduce new forms of learning which lead to sustainable lifestyle behavioural changes among participants such as Otte [2] which introduces a course concept called 'Experts in Teams' (EiT) as a new platform of learning which makes use of experience-based learning to address sustainable development in an academic context.

Another educational experience is the sustainable campus project of National Taiwan Normal University has been an environmental education platform for both formal and non-formal education. This project demonstrates how to actualize the concept of sustainability in our surrounding environment by strengthening participation of local teachers and pupils in curriculum-centered environmental learning and change processes [3].

Geli et al. propose practical intervention on a case-specific basis helps orient the students towards a future with a perspective of sustainability [4].

In this study, an investment for design textile and clothing students is essential to learn about sustainable design, because it's very much the future of our industry. So this article aims to present a teaching experience for textile and fashion designer students and to emphasise the importance of sustainable design, teaches them the basics of sustainability, and will be a building block for future courses in the program.

In this context, a number of students choose to focus on sustainability for their project. The goal of those experiences is to create textile product collection with an eco-design approach while having a good-looking. Thus, the used eco-design approach in those projects gives the textile and fashion designer student knowledge, tools, and access to resources they need to build viable products and ideas based on sustainable design practices.

LITERATURE REVIEW OF THE ECO-DESIGN IN THE TEXTILE SECTOR

Eco-design is an early stage of a design, an approach to design of a product with special consideration for the environmental impacts of the product during its whole lifecycle.

The last two decades have seen a proliferation of terminology relating to the incorporation of environmental considerations into design. Applying eco-design principles to design and development has become more widespread as the benefits of producing environmentally responsible products have been recognised. Additionally, designers have become more skilled to take these issues into consideration during the design process, for example, a Toolbox for Sustainable Design Education [5] which aims to help developing sustainable design, has been produced. Additionally, it has recently been accepted that in order to make eco-design success, it needs to be integrated into the design process at the earliest possible stage in the product development process [6]. In fact, the environment is one of the major preoccupations of the 21st century with an increasing awareness of environmental issues within industry [7-9]. Indeed, environmental impact and performance has become one of the primary criteria taken into consideration by customers in choosing a product [10].

Textile sector is also concerned by this approach; the textile industry is facing more and more constraints relating to the environment, especially in more developed countries. At the same time, there is a clear demand by the consumer of eco-friendly textiles, but without increasing the price. On the other hand, safety aspects also impose restrictions to textile processing, both in terms of the health and safety of the workers and that of the consumers. These constraints have a high impact on the textile finishing processes, including the choice of dyes, finishes and chemical auxiliaries.

In this context, design education with eco-design practice try to promote innovative and commercially viable fibres, fabrics and products that embody a range of sustainable principles and new technologies showing more sustainable alternatives to the widely available conventional fabrics that currently dominate the market, helping fashion companies to begin diversifying their fabric base and lowering their environmental impact at the same time. Compared with other materials, textile products are generally lightweight, flexible and their ever-increasing employment makes the design task more important and challenging. Most importantly, they are omnipresent in our lives [11], and provide a large surface area which can be exploited as support of ecological message for sensitisation. Indeed, today the garment represents a universal language and becomes a tool of communication and education [12].

METHODS

A series of projects in classes was developed for fashion designers students about sustainability. Methodologically those projects are a combination of theoretical reflection and practical design work; concept formation on basis of exploration of different kinds of textile and fashion eco-design processes, from very commercial design to very experimental and critical design.

Those projects take a holistic and interdisciplinary approach to design positioning itself as ecologically, ethically, socially and economically sustainable. They symbiotically unify research, education, practice and business to inspire students to explore new solutions with critical rigor.

By those projects we are trying to rethinking the ways of designing and manufacturing the offering that is based on consumer needs and sustainability. Thus the question to be addressed is how textile and clothing offerings should be designed and manufactured to better suit consumer preference in a more sustainable way.

Those projects aim to:

- Valorise natural raw material
- Design Sensitization message
- Use technology for sustainable comfort textile product.

Those projects are described below:

Project 1

Fashion designer student is embracing communication and sensitization with textile material to design sensitized message for children by using textile material.

Project 2

Technologized textiles and sustainable fabrics are among the most innovative designed today, and together they are driving the rest of the industry dramatically forward. In this project, fashion designer student is integrating hi-tech fabrics to see how the development of fabrics today is immersed in technology, sustainability and innovation.

Project 3

Using sustainable color to design new aesthetic and color effects on textile material.

In those projects, we have employed several eco-design strategies when introducing the eco-design concept for textile designer students; in particular, design for durability and minimised resource use. This design is based upon:

- Reducing the consumption of resources by enhancing recyclability.

- Reducing the impact on nature:

- By using biodegradable textile materials.

- By using plant dye to improve the aesthetic quality of this fabric, without adding toxic chemical substances used within industrial dyeing.

- Increasing product value by providing an additional function to classic textile support and focusing on sensitising and communication function of textile material for the first project, the textile functionalities for the second and sustainable nature color and effect for the third project. The use of ecological textile products can also be an indirect message for sensitising consumer about our need for preserving ecology and our need for more and more well-being.

For a better understanding, each project has been divided into four parts, which are presented below:

1. The systemic vision and the value chain in the textile and fashion industry, which includes a broad vision of the industry, the supply chain, processes, design and the disposition phase.

2. Marketing, brands and regulatory aspects in the textile and fashion industry.

3. The practice in textiles and fashion, section in which several cases related to the industry are presented.

4. Consumer: purchase, identity, use and care of clothing and textiles.

In all those projects, a consumer questionnaire was used to gather insightful knowledge regarding consumers' environmental attitudes interest and worrisome issues in the field of textile and clothing manufacturing and further to map consumers' interest in various design strategies, in order to find more sustainable ways to fulfil consumer needs and to attain sustainable improvements in the relationship between production and consumption.

Each project is composed by: inspirational text and striking visual spreads to include design sketches, work-in-progress photographs and digital drawings alongside images of cutting-edge furniture, interior textiles and fashion.

RESULTS

In this part, we will present some results of the design projects realized by textile and fashion designer students that offer a new approach to sustainability but which today still operate as niche practices.

Project 1

In this survey, a child centred participatory approach is used. Enabling children, as much as possible to be involved in all design process, including giving them a real choice of how and when to participate. The drawings achieved by the children and their faculties of analyses and syntheses were used as inspiration source like presented in the following **(Figures 1 & 2).**

Figure 1. Children drawing.

Figure 2. Graphic research.

The first stage of the design process consists on developing, in association with children of 8- to 11-year old, a data base of ecological components that takes into account the children ecology perceptions.

The second phase of the project is focused on transforming those children ecology perceptions to develop ecological textile sensitising message by using an eco-design approach.

The **Figures 3-6** represent some of those researches.

Figure 3. Graphic research.

Figure 4. Graphic research.

Figure 5. Graphic research.

Figure 6. Textile research.

Project 2

In this project, the key questions of relevance to designing textiles for the 21st century may be summarised as follows: "How do we reconcile ecology and new technology? With the current progress in nanotechnologies, how do we engineer invisible functions with new aesthetics?

This project describes methods, new raw materials for designers especially for functional textile products. It permits to give many propositions by integrating new technologies for sustainable textile design.

Among the propositions, the model presented in the following **Figure 7**:

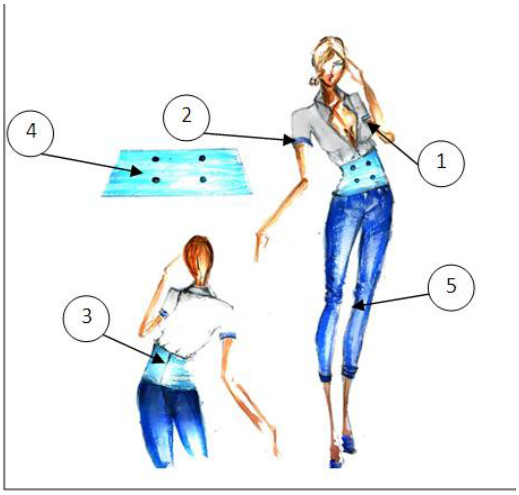

Figure 7. Functional sustainable model.

This ready-to-wear model adds more comfort to the user especially thermal comfort and relaxation.

For the liner (1), we chose a microencapsulated fabric that spread gradually by the contact with the wearer's skin. These microcapsules are characterized by a cooling effect, which gives a feeling of comfort. On the waist, there are electrodes embedded in the fabric with intensity control (2), those elements can be removed when washing this shirt. We added on the back of the jacket (3) relaxation electrodes. The model shirt's fabric consists of microcapsules, which have a porous aspect with a cooling effect which is characterized by an immediate drop in temperature, and it is a breathable, anti-odor and light fabric.

The belt (4) and the jeans pant (5) are made of a photo-catalytic light fabric, for air treatment which filters polluted air.

This model is designed to be worn at all times of the day, it is considered, on one hand comfortable and for more well-being And on the other hand permitting air treatment by photo-catalytic light fabric.

Thus, through an intelligent utilization of the available new resources, technologies and process, Ecodesign aims at to ensure maximum benefit for all actors involved as well as consumer satisfaction, while causing only minimum environmental impacts.

This model can also be designed by using an interactive electronic fabric, which has the possibility to capture the energy of the human body, to store it and to be used to recharge the mobile or computer etc.

Project 3:

In this project two tendencies which are looking for more comfortable textile product and also looking for more ecological textile product are combined. Linen fiber was used as inspiration source, this natural fiber is a noble fiber that proves a real elegance; it is a relaxing matter, an allergic, comfortable, anti-stress.

An Eco-design practice, natural dyeing by using prickly pear, was used to design linen fabric structure to encourage consumers to take advantage of the relaxing and comfortable aspect of this textile raw material.

Thus, new texture for linen material was designed to help the fashion designer to integrate more and more the linen fabric, not only in the ready-to-wear, but also in the Haute Couture for more comfort, and more ecological sensitisation.

The following **Figures 8-10** present some of those designed fabrics.

Figure 8. Tie-dyeing effect on linen fabric.

Figure 9. Wrinkling effect dyeing on linen fabric.

Figure 10. Textile model created by irregular weaving.

CONCLUSION

In recent years there has been a growing interest in approaches design education. This growing interest has been in part a response to consumer needs for more sustainable product and in part a response to changes specifically within the realms of design education.

This study concentrates on eco-design approach education and is constructed on the basis of textile and fashion designer student projects.

In those projects designers' students are focusing increasingly on sustainable development. This not only adds value to their products but also boosts their competitiveness in the future. The designer becomes a natural link between producer and consumer. In the long term, good design solutions can contribute to sustainable development.

Each student combines an interest in sustainability with recognition of the relentless pace of the trend cycle by creating new fabrics made entirely of edible materials. Those projects focusing on sustainable textiles, what we really mean by the term 'sustainability', and how we can assess the impact and benefits of our fabrics.

This paper is promoting a holistic, multidimensional and more sustainable vision of the textile and fashion sector, through knowledge generation and transfer and education method. This work is intended to be used in an educational context to transform the simple cloth into a carrier of sense, of message, a tool of sensitization.

Those projects permit for student to focus on sustainability for their projects by incorporating sustainability practices, they improve also the textile designer knowledge, tools, and access to resources by building viable projects based on sustainable design practices.

The eco-design approaches presented above can potentially lower the environmental impact of clothing and textiles. But, more efforts need to be realized like working with industry leaders on special projects.

Others principles of eco-design can be used in others projects like:

- Design for reuse and recycling: "Products, processes, and systems should be designed for performance in a commercial 'afterlife'" [13].

- Biomimicry: "redesigning industrial systems on biological lines ... enabling the constant reuse of materials in continuous closed cycles..." [14].

These diverse contributions represent a major step forward in expanding the knowledge base of this nascent relationship (textiles–fashion and sustainability).

Finally, the more we can integrate ecological products in our daily lives, the faster we can move to a more sustainable future. Individual choices and small changes to our lifestyles can positively affect our environment and improve it. These environmental improvements in textile design only form a small part of sustainable design. The textile sector has a long way to go in order to make real advances in innovation and, therefore, greater gains towards sustainability.

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