

WRITING A PHD IN DESIGN AND KNOWLEDGE TRANSFER - INTERDISCIPLINARY DESIGN EDUCATION (CASE STUDY TEXTILE ENGINEERING + DESIGN)

Marina-Elena WACHS

Hochschule Niederrhein University of Applied Sciences, Germany

ABSTRACT

The structure of European doctoral programs in design with international comparison in cooperation programs is focused on creating a structured program for a PhD in design with international academic status. In Germany we saw the interest in writing a PhD in design and the role of design theory and research increasing in the last decade. In case of product design or industrial design, the typical way of engineering is demonstrated by the departments of mechanical engineering. In the last years the interdisciplinary way of working together with designers, engineers, artists, and consumers on technical solutions of the digital world and in the way of creative processing has increased in an enormous number of projects. Product engineering is related to textile educational programs in engineering + design as demonstrated in the following.

Smart technologies and smart textiles are more and more linked together in a wider interdisciplinary way of designing, which invites taking a closer look at the question: where do we come from in the field of education of designers? We present interdisciplinary design education in different design fields and with different levels of student BA- and MA-programs. We want to argue for the necessity of PhD programs to be offered at universities, in cooperation with companies to bring knowledge transfer in design to a higher level: intercultural and inter-generational (textile) design education with integrated engineer courses.

Keywords: PhD and doctoral in design, interdisciplinary academic education in EU, transfer in inter-generational education, textile engineering + design, interactive and intercultural design programs.

1 INTRODUCTION

The structure of European doctoral programs in design in international comparison is the aim of creating a structured program for a PhD in design with international academic status. In Germany writing a PhD in design does not have a long tradition, but in the last decade we saw the role of design theory and research increasing [cf.1], and a demand for marrying the sciences and arts/design [cf.2], as a basis for establishing comparable doctoral programs in design in Europe as consequence of the Bologna Process, arises. It is our aim to create smart and sustainable design solutions with the help of design research as part of a European doctoral program together with other European partners. As a consequence, we will take benefit in connecting the European Higher Education Area with the European Research Area to strengthen international cooperation between universities and institutions with the Lisbon Strategy goal of making the EU the most competitive economy in the world [cf.3]. With the help of case studies from interdisciplinary projects in the case of textile engineering + design, e.g. "sustainable textile design" and "smart sustainable solutions connecting people – the German Look compared to other national perspectives" – we present interdisciplinary design education in different design fields and with different levels of student BA- and MA-programs. We want to argue for the necessity of PhD programs to be offered at universities, in cooperation with companies (industry + engineering + design) to bring knowledge transfer in design to a higher level: intercultural and inter-generational design education with integrated engineer courses. An earlier design thinking of children and young people is necessary and would mean that design education should be taught at an earlier stage at secondary and primary schools to circularise design thinking.

2 PRODUCT ENGINEERING + DESIGN IN CASE OF TEXTILE ENGINEERING + DESIGN

Smart technologies and smart textiles are more and more linked together in a wider interdisciplinary way of designing, which allows a look at the question: where do we come from in the field of education of designers? In case of product design or industrial design (older term, which is not anymore as common at modern universities to express an innovative mind set) the typical way of engineering is demonstrated by the departments of mechanical engineering. In the last years the interdisciplinary way of working together with designers, engineers, artists, and consumers for technical solutions of the digital world and in the way of creative processing, education came into focus: an overall interdisciplinary and interactive designing [cf. 4]. The education system in Germany is a federally-defined system – but more important is the cultural impact of working in one discipline and the high level of product quality characterised by the “Made in Germany”-icon. This applies not only to a high standard in engineering programs and the following long tradition of engineering studies education.

Within the former education in Germany, people were trained in a classical manner to learn **one** specification. In case of industrial design, the impact of engineering courses stood in relationship to the practice-based experiences of the professors, because they also defined the curriculum of the study programs. In the last years two other aspects have come into focus to define new structures for the curriculum. First: the Bologna Process has had more influence in a comparable way, how to create the study programs of one discipline in one country, that the students could work around the world in a “globalized” pattern. Second: several institutions have come into being to shape internationally or nationally comparable structures – the unique features of the study programs are only a question of terms and expressions of ONE University to demonstrate and communicate the profile – a profile different to other universities. At the Hochschule Niederrhein - University of Applied Sciences, we have ten faculties, and Faculty 07 – Textile and Clothing Technology is the oldest one, existing for more than 100 years with a long tradition of applied textile education and cooperation with textile industries. The need of textile experts for the so-called “Manchester of the Lower Rhine” 100 years ago, formed the textile-engineering-based education. Now, at the beginning of the 21.st century we know that the scientific and practice-based education needs the creative industry, and, at the same time, the creative mind set in a manner of research as a consequence of BAUHAUS the “artistic research” included as part of our BA and MA programs in design. We have to look at other disciplines – from engineering to sociology – to take benefit from smart and sustainable solutions for design applications for today as well as for the future generations.

The following designs and design research studies will give an insight into textile design education¹ in Germany and as a part of that advanced studies in master programs in an intercultural manner like design thinking and fashion thinking for the future.

3 TEXTILE ENGINEERING + DESIGN-EDUCATION IN INTER- AND TRANSDISCIPLINARY WAYS – WITH SPECIFICATIONS

The overall topic of the interdisciplinary project “The German Look at Design – advanced TEXTILE solutions”, which is presented in 2015 in different venues, will show a collection of several Bachelor (BA)- and Master (MA)-student projects and research works of MA students, with the following topics:

I. Smart Textile and Mobility in Fashion: SMART FASHION – “creative processing” II. Luxury and sustainability: “White World” III. Design concepts...for a better world IV. Textile Porcelain V. Smart mobility to go VI. Kids World – (textile) patterns connecting generations.

¹ <http://www.hs-niederrhein.de/textil-bekleidungstechnik/projektstudienarbeiten/fb07-german-look/>



Figure 1. clever kids crocheting, by J. Jandoo. Figure 2. deployable interaction, by L. Kisser, 2015

The challenge for the students lies in defining the typical character of each cultural design code in combination with discussing the terms "Luxury" and "Mobility", "Sustainability" and "Smart Textile", for example, in fashion AND automotive interior design for advanced design solutions for tomorrow. Forecasting trends in smart textiles, like the currently discussed terms about "Biocouture" [cf. 5] and – so to speak – "Green Smarts" [6], are only two small aspects of research projects in a new material world. "Upside downing" in up-cycling design and redesign of handcraft techniques demonstrate the range of parameters regarding sustainability. With the look at the German style and, for example, in comparison to Scottish or Italian fashion design codes or with the craftsman's knowledge, we will demonstrate "The German Look" in connecting cultural heritage of fashion design and handcraft power with 3-D techniques. This means that the case study automotive design on a higher level of education combined with creating textiles samples for fashion design **at the same time** shows the complexity for designing: sustainable + smart textiles surfaces, for example, for kids outfits + automotive interior applications. Look at the following studies of a selection of master research projects and master theses:

The following case studies are the results of an engineering-based textile design education, in which the students had the opportunity to work in a wide range of laboratories, doing research in different branches and at scientific -based congresses:

The upcycled jeans for the couture dress "sunshine & starglow" (cf. fig. 3) by Kathrin Erge, will be lightening up with the help of a LED-structure and a solar panel at the shoulder, which collect the energy by day for shining by night.

The smart and sustainable design in "Smart Bionics" (cf. fig. 4) by Lara Leetz shows biomimetics in fashion design + automotive interior design.



Figure 3. Sunshine & Starglow, by K. Erge, Figure 4. Smart Bionics, Design L. Leetz, 2015

Smart textile solutions for the automotive interior design for Tesla like "smart bionics", the surface texture of fish scales and their mechanical properties are transferred by simulation of a multi-layer leather hybrid: "Haute Tech" is quilted with an electrically-conductive yarn with photovoltaic properties, for fashion design and at the same time for automotive interior applications.

A different example of dichromatism in fashion design like smart bionics is shown by the interesting topic of a design by Philipp Trosien: "Mimesis, a fashion design strategy – nature's creations and it's

values, case study camouflage“ (cf. fig. 5). Biomimetics describe – analogous to mimesis in nature – a creative evolution that reinvents the archetype nature. The results are ‘disruptive patterns’ which make it impossible for human perception to differentiate between figure and ground. The concealment of the own identity inspired by nature can be seen as an interdisciplinary approach of bionics respectively biomimetics.

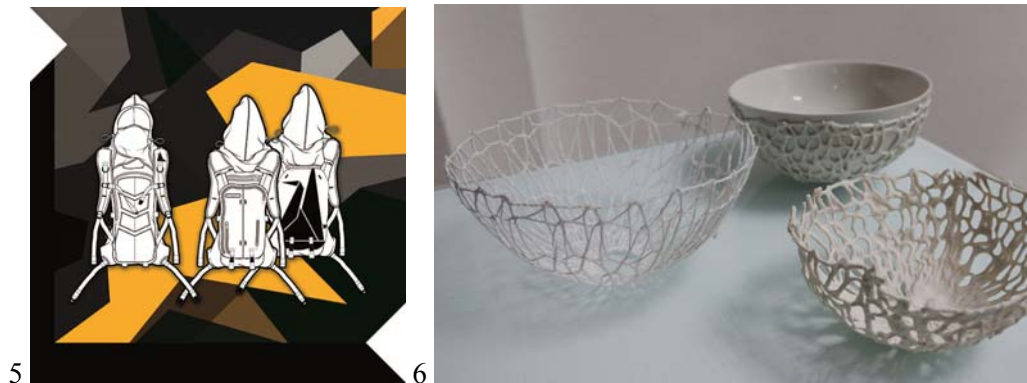


Figure 5. Mimesis, a fashion design strategy, Trosien; Figure 6. Lustgrund by M. Adler, 2014

Beside this natural and graphically-inspired design management for fashion, the prototyping of low volume production for sustainable luxury goods is demonstrated by the textile porcelain: “Lustgrund” (cf. fig. 6) created by Miriam Adler. The cradle of textile “manufacturing”, to make bobbin laces, is transferred into a new material. The combination of manufacturing and engineering knowledge will generate ideas for new applications in the materials sciences for design, like it is shown by kiln [cf. 7] and new combinations in nanotechnology [cf. 8].

Another example of connecting people and generations with the textile heritage or with the knowledge of textile manufacturing is the project by Jennifer Jandoo: “German kids clever against darkness” (cf. fig. 1) is a four months project by product developer Jandoo in cooperation with Dr. Marina-Elena Wachs, implemented at Jakobus Elementary School in Grevenbroich/Germany. Promoting handicraft, the project allows children to craft crochet hats with a fluorescent surface reflecting light when illuminated. In the context of crocheting, the objective of this project is the approach of a sustainable cultural and linguistic education by means of obtaining textile manual skills. Jennifer Jandoo chose to work with elementary school pupils to introduce the concept of an early education of motor skills using design within society at an early stage. Furthermore, counteracting the loss of traditional (textile) handicraft due to a generation change was utterly significant in this project. Both cultural and regional historical heritage of handicraft techniques were conveyed. These are the bases of an early touch of textile competence for the textile experts we need in the future [cf. 9].

The project demonstrates the possibility to touch textile history for the textiles future as well as to gain social and linguistic competence. At the same time it generates “abstract thinking”, necessary to understand artificial concepts of the future, and at the end of the educational process to be able to do “research in design thinking” [cf. 10]. It also displays the changing world on both sides of analogous and digital processes.



Figure 7. Fashion Thinking, by L. Witt, Figure 8. IQ-Leather: travellum bag by V. Winkelmann, bag and sketch, 2015

The excellent MA study of “Fashion Thinking” (cf. fig7) by Laura Marie Witt shows the combination of product engineering and textile engineering in the master program education for the next level of a fashion-minded development [cf.11] in combining the fashion system with augmented (engineered) reality [cf.12]. It shows an exchange of medial textile gadgets in an individual personalized style for the owner of the outfit. At the same time it exposes the complex process of the digital future society and a textile solution to protect oneself against the body scanning of privacy.

4 CONCLUSION: INTERCULTURAL, INTERGENERATIONAL AND INTERDISCIPLINARY EDUCATION FOR SCIENTIFIC RESEARCH IN DESIGN

With the help of knowledge transfer in cooperation design projects in an interdisciplinary education style, working on one topic on different education levels, the BA- and MA- students and graduate students take advantage of transdisciplinary learning platforms in design. We have to focus on two challenges of the doctoral programs in design: first there is the acceptance by other disciplines, which have been established for quite some time, to discuss on the same level [cf.13] and to design together [cf.14]. The second challenge is based in the term "artistic research" in relationship to the applied sciences. EARN (the European Artistic Research Network) was established in the year 2004, with the aim to exchange research knowledge and experiences. But for the future we need to integrate experts' knowledge with the help of cooperation projects of graduates [cf.15], universities and companies for knowledge transfer in design on a higher educational level: intercultural and inter-generational design education. A result of education in primary schools at an earlier stage should be to encounter the textile manufactured and engineered heritage as this is required to be a textile expert one day. The fundamentals are to think about the next generations of textile products and to generate the next generation of textile experts with the help of an engineering-based design education in combination with enough space for artificial creativity and research vice versa: art takes benefit from engineers' knowledge like design takes benefit from engineers' knowledge.

The creative industries have a great scientific and economic impact on all branches: fashion and product design, automotive industries, interior architecture, architecture, art, theatre and other. The research study of “IQ-Leather – light lines in leather design for >BLUE Luminous< design concept”, the travellum bag” (cf. fig. 8) by master student Verena Winkelmann shows the complexity of applied engineer know how as designer: to fold the bag in a linear structure inspired by the form of the star, the icon of Mercedes Benz in a sustainable vegetable tanned eco-leather and by lightning by night with the help of nature-based luminescent colours. The lines are constructed in the structure and pattern of the travellum bag, inspired by a free linear interpretation of the star.

Formal Inspiration – Design Process – Research in Materials Sciences – Engineer Process (for the prototype) – Users interest in focus, these are the process parameters for the textile engineering + design creation, for smart and sustainable textile products for the future. These are the parameters for textile engineering + design education.

It is our aim to create smart and sustainable design solutions with the help of design research as part of a European doctoral program together with other European partners. As a consequence we will take benefit in connecting the European Higher Education Area with the European Research Area to strengthen international cooperation between universities and institutions with the Lisbon Strategy goal of making the EU the most competitive economy in the world [cf.16]. The first steps are done with interdisciplinary design programs in small projects at the university in transfer to greater socially-relevant topics, created and discussed at the expositions and events with each other – with experts and with the civilian population.

The next level is to fix standards within the curriculum and to make exchange programs around these projects/topics possible together with students of European universities – with financial European support – for investment in European cultural education. Intercultural graduate programs can be realised. We have to consider both: exchange of smart and sustainable textile statements in an intercultural and – so to speak – inter-generational way on every student's level and, at the same time, to initiate textile competence and design on an earlier educational level than we do today at school. Touching textile heritage in transfer of textile-engineering knowledge on different educational levels is needed to serve and to provide next generation textile experts in design + engineering.

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