

# EDUNOVATIC2020



## CONFERENCE PROCEEDINGS

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# Features of material exploration projects emerged in design schools

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## Abstract

With the updating and enrichment of the current design culture, design education is facing more opportunities and challenges. Material, as an important element of design, provides different ideas and creative paths for design education. These days, different kinds of material explorations and projects by students in design schools are attracting our attention – these emerging material-based projects with their meaningful storytelling show that design students are trying to build comprehensive understanding on materials' attributes and to view material through different lenses such as social, environmental and humanities. This paper will analyse the emerging material exploration phenomena in design schools, and try to understand its reason and importance in the current design and material education. It contains three parts: an introduction of the changing context of material world and how this change has impacted design education, the explanation of analysis objectives and the methods, and the discoveries of the features in the selected material exploration projects. The research attempts to reveal that material exploration projects could cultivate design students' ability to view and resolve problems from different perspectives and recognize their social responsibility required as designers today.

*Keywords: material education; material exploration; design education; materials experience.*

## Introduction

In design education, the teaching and learning of materials can never be absent. The first design school, Bauhaus, already proved that in its basic course with 'study of materials and tools', 'study of nature', 'study of materials', 'space study – colour study – composition study' four-section curriculum. By manipulating and playing with materials such as clay, stone, wood, metal and glass, students were able to achieve primary and unique characteristics on materials, textures, and colours (Rognoli & Levi, 2004), and gain design abilities from the hands-on approach. Besides, material selection according to their technic properties can be considered as a prerequisite of designers (Dieter 1997; Ashby 1999), so the course on material types and technical properties are very fundamental in design schools.

However, the way designers consider materials is under a transition. Aside from technic properties, designers started to be more curious on the 'personality' of materials. They can be called as materials' experiential attributes such as the sensorial aesthetics of the materials, the emotions they trigger, their meanings and values to the environment. etc. (Ashby & Johnson, 2003; Ljungberg, 2007; Karana *et al.* 2008). The emerging material exploration activities show the designers' passion on manipulating ma-

materials, and they bring a changing and evolving material world: materials can be grown, materials can be domesticated, materials can be smart and able to interact with human beings and the environment, materials can be solutions on local or sustainable issues (Rognoli et.al, 2015; Collet, 2017; Camere et.al, 2017; 2018; Rognoli et.al, 2017; Brownell, 2017; Drazin & Kuchler, 2015).

If one of the most important challenges in design material education is to keep materials' course contents updated with the innumerable novelties, moreover, the revolution in design education would be to activate design students' abilities and to enable their metacognitive attitudes on tackling with increasing innovations and emerging activism forms (Fischer & Giaccardi, 2006). Today's teaching approach in materials and design becomes more dynamic, students are not just required to stay in a classroom learning physical properties for material selection and studying materials' applications, but they are encouraged to perform hands-on activities to explore the materials experience (Zhou, 2020). DIY-Materials by Valentina Rognoli (Rognoli *et al.*, 2015) considered the globally active design trend and suggested it is possible to begin a design path from the material's design. It refers to materials designed and self-produced, thanks to the creative input of the designers who experiment with materials and transform them. Materials appear to be more human and focus on the social dimension and circularity. The DIY-Materials phenomenon can be explained as an original way to make material storytelling and speculating on possibilities and the unfinished (Celi & Rognoli, 2018). It is a moment to witness that designers are using material exploration and self-production to express and try to resolve many issues, such as the consumption and reuse of resources, environmental changes, the inheritance and renewal of culture, and the sustainable future of human beings.

This paper, with the analysis of the materials exploration projects as emerging design educational outputs, will elaborate their creative features, their ways of storytelling, and their roles in design education.

## Methodology

In order to understand the material innovative phenomenon and activities in design schools today, the examples of the emerging, novel and speculative material design projects in three design schools had been collected and analysed to understand the design process and the pedagogical approaches behind it.

### *Collect emerging material projects in design schools*

There are many projects that stand for an unconventional perspective on material research and practical projects, also they impressed people by their foresight and vista on future issues. With a broad desk research, several examples of student projects were being collected from different design schools. There are two projects from Rhode Island School of Design, seven from Politecnico di Milano, one from Delft University of Technology, twelve projects from UAL, seven from Design Academy, and five from Offenbach University of Art and Design. Table 1 shows the list of these projects. Many of them were exhibited or promoted with a great social response because of their future-centred intentions and compelling communicative approaches. Here are some descriptive examples:

- **Foreign Garbage:** this project by Katie May Boyd used the beaconing cat or Maneki-neko as a media for questioning and discussing plastic waste. It is based on the fact that the UK used to export most of its waste plastic to China, however, China had enacted a ban on importing 'foreign garbage' since 2018. This became the "game-changer" for the UK recycling industry which have relied upon China to dispose of their rubbish. In order to understand and explore

this issue, this project focused on expanded polystyrene or EPS as one specific waste stream, aims to encourage people to start question the status quo around how we treat plastic and other materials nowadays and to think about the absurdity of shipping these waste materials around the world (May Boyd, 2018).

- **Bio Iridescent Sequin:** Elissa Brunato created sequins for embroidery industry of the current fashion and textiles system. By material experimentation, she used wood's ability to form structures that refract light. The wood-originating matter can imitate the alluring visual aesthetics of beetle wings with the extraction of the cellulose's crystalline form. The material remains lightweight and as strong as plastic, yet it is compostable. The development of this material aims to reduce the use of petroleum plastic or synthetic resins that is used to produce shimmering beads and sequins today, and contribute to the micro-plastic issue that we are currently facing (Brunato, 2019).
- **Soils in Residency:** this project by Marianne Drews is a reaction to the current threat of 'Peak Soil' and seeks to materialise a new culture of soil within local and global scales. Healthy soil plays an important role for the planet's ecosystem, but nowadays fertile soils are becoming scarcer because of the global soil loss. Soils in Residency project promotes knowledge exchange and soil resource sharing by creating a transdisciplinary platform. It can address soil issues in a more complete and meticulous way and also takes the ecological, cultural, social and political issues behind it into account (Drews, 2019).

### *Analysis of the projects and generate material storytelling patterns*

Information about these examples is collected and coded to extract key elements and list their salient features. These characteristics include [1] the type of original material (based on which raw material is the project made?) [2] the features of material innovation (can similar projects somehow be categorised and generate some features?) [3] key competencies (what kind of capabilities and professionalism did the design students demonstrate to deliver their projects?). By grounded theory (Strauss & Corbin, 1994), all the information is coded hierarchically, conceptualized line by line from the project transcripts, and being placed under their own category.

*Table 1. collected material exploration projects in design schools*

Project name	Affiliation	Designer	Time
The Coral Micro Farm	Rhode Island School of Design	<a href="#">Hyunseok An</a>	2019
Carbon-Negative Raincoat	Rhode Island School of Design	<a href="#">Charlotte McCurdy</a>	2019
Grassmap	Politecnico di Milano	<a href="#">Barbara Cerlesi</a>	2019
Porcaria	Politecnico di Milano	<a href="#">Multiple authors</a>	2019
Greenet	Politecnico di Milano	<a href="#">Multiple authors</a>	2017
Dreamilk	Politecnico di Milano	<a href="#">Multiple authors</a>	2017
Mussel Shells	Politecnico di Milano	<a href="#">Chiara Stopponi</a>	2019
The Fabric Project	Politecnico di Milano	<a href="#">Valentina Marino</a>	2017
The Fluff Project	Politecnico di Milano	<a href="#">Valeria Munda</a>	2017
Interwoven	Delft University of Technology	<a href="#">Jiwei Zhou</a>	2019
Foreign Garbage	University of the Arts London	<a href="#">Katie May Boyd</a>	2018
Soapack	University of the Arts London	<a href="#">Mi Zhou</a>	2019
Seam Unseam	University of the Arts London	<a href="#">Naila al-Thani</a>	2019
AW18: The Future Is Plastic	University of the Arts London	<a href="#">Marcel Nieto-Glowacki</a>	2019



In The Spirit Of Kamiko	University of the Arts London	<a href="#">Katarzyna Suzuki</a>	2019
Re-Value	University of the Arts London	<a href="#">Helga Arabottir</a>	2019
Bio Iridescent Sequin	University of the Arts London	<a href="#">Elissa Brunato</a>	2019
Nurturing Kelp	University of the Arts London	<a href="#">Diana Tso</a>	2019
Made By Moths	University of the Arts London	<a href="#">Chiara Tommencioni Pisapia</a>	2019
Wool: Re-Crafted	University of the Arts London	<a href="#">Nathalie Spencer</a>	2019
Skin li	University of the Arts London	<a href="#">Rosie Broadhead</a>	2019
Bio-Kintsugi	University of the Arts London	<a href="#">Yiwei Cui</a>	2019
Tulip Pyramid	Design Academy Eindhoven	<a href="#">Jing He</a>	2016
Dutch Wife	Design Academy Eindhoven	<a href="#">Aram Lee</a>	2017
Ways of Altering	Design Academy Eindhoven	<a href="#">Thomas Ballouhey</a>	2016
Crossing Parallels	Design Academy Eindhoven	<a href="#">Amandine David</a>	2018
Plastic Culture	Design Academy Eindhoven	<a href="#">Marco Cagnoni</a>	2018
Soils In Residency	Design Academy Eindhoven	<a href="#">Marianne Drews</a>	2019
Blood Related	Design Academy Eindhoven	<a href="#">Basse Stittgen</a>	2017
Maku	Offenbach university of art and design	<a href="#">Valentin Brück</a>	2019
GLAS Hybrids	Offenbach university of art and design	<a href="#">Multiple Authors</a>	2019
Plan B	Offenbach university of art and design	<a href="#">Multiple authors</a>	2019
Synthetic Mineral Accretion	Offenbach university of art and design	<a href="#">Florian Hahn</a>	2019
Zusammen	Offenbach university of art and design	<a href="#">Maja Magdalena Hamacher</a>	2019

## Results

By studying the projects, the creative patterns of material storytelling have emerged. How students design with materials, explore their potential and new roles in the future is defined in the process. Also, from these material-based projects with a strong storytelling, key capabilities, which material designers need, are being highlighted. Four main categories can be extracted from the analysis, showing these material-based projects' main features:

1. Critical thinking in regard to material flows/resources and generating new alternative solutions on materials: by research, analysis, and experimentation on feasible material alternatives, providing material-centred prototypes in order to respond to the global or local resource issues and/or deliver solutions on enhancing current material systems;
2. Experimenting on materials derived from nature (organic or inorganic): transforming or creating new nature materials with hands-on approaches, tinkering with materials and conducting do-it-yourself processes to transform them, to get novel material results and their production techniques;
3. Giving traditional materials or objects a new life: exploring the changes of traditional materials or related objects in a new cultural context, manipulating materials to achieve an enhancement of materials' values on senses, emotions, meanings or cultures;
4. Exploring a future scenario with a certain context: from a more post-human perspective, to get a far future utopian or dystopian vista and criticise the various roles that materials may play in future scenarios.

These projects consider material as a dynamic and designable element, which can be manipulated and experimented on, rather than to see materials as static and taken for granted. It requires critical thinking and inquiring towards the material itself and the system behind it, and with the first-hand ex-

perience and experiments on materials during the design process. They do involve a certain level of speculative thinking on materials, because they put forward critical and predictive thinking and innovation for our human future. In addition to considering transversal resources, cultures, societies and other issues, they also contribute to anticipating future material scenarios. Using design as a means, some of the projects focused on a responsible and sustainable future and build thought-provoking visions. The “future as a cultural matter” (Appadurai, 2015) is embedded in the constructs and communicative material practices.

Besides, certain material competencies were being highlighted through the analysis. It can somehow clarify why some design courses emphasise on materials exploration and encourage students to take the materials into full consideration. These material competencies include not only understanding and designing with materials and their properties, but also their experiential attributes by experimentation, research and speculative thinking.

Firstly, students can gain the design ability from material processing innovation to give new experience on original raw materials by creative manipulating and reproducing materials and their processes. This kind of ability requires passion on testing and evaluating material “ingredients” during self-production processes repeatedly. Besides, an open mindset and active learning on multi-disciplinary knowledge are involved in the process.

Also, to develop the material exploration projects, students have to understand and try to use emerging technology: they probably need to transfer some properties of the material with cutting-edge technologies to give them new characteristics, such as to develop a smart, interactive, connected material sample; and to transfer more value to the material and to gain application space in future technological scenarios.

The third competence is matter of a vision on sustainability: students could get better training in critical thinking and in researching the resource issues, material flows, and their impacts to humanity and the environment. In designing materials project it is almost essential to understand where the material comes from, and where it goes.

Another competence is the ability to explore and build the relationship between people, objects and materials. Students, in this kind of project, can profoundly think of the experiences and meanings brought by materials, and be able to question the nature of materials and the things connected to it. This is a speculative ability which could encourage people to rethink their own roles and the things around them.

## Discussion

The issue of material is frequently discussed today. The analysis results above give a vision that, nowadays design students are being encouraged to explore materials in different approaches and they are generating many attractive and unconventional study outputs. From this research on the features of emerging material exploration projects, several interesting material innovative trends have been noticed by the authors:

- From the micro to macro: currently, the domestication of biotechnology seems to arouse the interest of material designers. Research and practical experiences on cellulose and bacteria in the micro world give designers the opportunities to reflect and explore the updating technologies.
- Revival of tradition □ a large number of traditional materials have been redefined, redesigned, and their socio-cultural values have been redeveloped by material designers. This means that designers not only have a new understanding of the hybridization of the global social backgrounds, but also give a new consideration to and a practice in cultural iteration.



- Education and engagement in public towards plastic issues: the overuse of plastic, which also brings the ecological imbalance, is an eternal issue nowadays. Compared to the conventional design innovation on finding new usages and new recycling methods for waste plastics, today's design projects on plastics focus more on building high-efficiency recycling systems and expanding the impact of plastic solutions by educating and engaging the public.

Design educators are creating the future of design culture, and such a future is bound to coexist with openness and criticism. Designers can have diverse identities and roles in the future to be more social and environmental responsible, and the exploration and speculation on materials can be an important output. With more novel materials, forms, emerging functions and generated ideas, designers can be able to increase social impacts through design in various contexts.

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