
11th LUMEN International Scientific Conference Communicative Action &
Transdisciplinarity in the Ethical Society | CATES 2018 |
23-24 November 2018 | Targoviste, Romania

Communicative Action & Transdisciplinarity in the Ethical Society

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<https://doi.org/10.18662/lumproc.110>

How to cite: Mandea, M. (2019). Digital Post-processing on Scale Models - A Tool in Design Education. In C. Ignătescu (ed.), *11th LUMEN International Scientific Conference Communicative Action & Transdisciplinarity in the Ethical Society | CATES 2018 | 23-24 November 2018 | Targoviste, Romania* (pp. 180-189). Iasi, Romania: LUMEN Proceedings.
<https://doi.org/10.18662/lumproc.110>



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Conference **Communicative Action & Transdisciplinarity in
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Digital Post-processing on Scale Models - A Tool in Design Education

Maria MANDEA¹

Abstract

Design education can benefit from using a more integrated approach between digital techniques and traditional model-making. This approach expands perception and can add layers of imaginative thinking, advancing the design process. Model making is an important tool in design as a way of developing and transmitting ideas in a three-dimensional manner. Also photography has been used in the past to understand and perceive design models. However, in recent years, due to both photography and digital post-processing of images being made accessible on a larger scale, it is becoming used as a fast rendering technique by some professionals and students. But it isn't yet being used in design education. The process has three stages, without being linear: model-making, photography on the model and post-processing. They often influence each other, as new information and creative input in one stage can determine changes in another. So the model will affect the photograph and the post-processed image and also the post-processed image can induce changes in the model and, therefore, in the form of the object. This paper is based on theoretical research, observations of current practice and three workshops done at the Architecture School in Bucharest in February-March 2018. It expands the ways in which we can use accessible technology in design and design education.

Keywords: *digital; post-processing; education; design; photography;*

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<https://doi.org/10.18662/lumproc.110>

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Selection and peer-review under responsibility of the Organizing Committee of the conference

Introduction

Model-making has been one of the fundamental techniques in design teaching ever since the Bauhaus and Vkhutemas schools. Today, many teachers in design and architecture learning institutions still advocate for model-making as a basic technique for learning, along-side drawing [2]. It offers multiple possibilities, from visualising forms in 3D space to quickly trying different routes that the final design might take. It also breaks from the usual, mostly visual, way a students' work is presented. A 3D classical model is perceived both tactile and in motion, adding extra layers of understanding, both of the student on his/her own work and as a communication tool. However, in the last two decades, digital 3D models have become standard in professional design contexts. And they are also taught in most design schools, even if not from the first year. They have become more and more accessible and easier to work with as the software industry has progressed. And will continue to do so in the near future. Another trend in design visualisation is collage. But in many cases, collage happens only on visual level, on the final, render image. However, another process is possible, involving craft, photography and digital. It is divided in three parts: model-making, photography and post-processing of images. The three parts influence each other for a better learning experience.

Craft and design education

Craft is now understood as a form of practice-based research. In some pedagogical systems, especially in the northern part of Europe, thinking through material is a very important part of the curricula from the very first school years. Sloyd education [16], a term that regards craft education in the Nordic countries has been established for many decades and it is also part of design practice and theory. The arguments for craft education vary from the hands-on, learning about materials and processes, to the psychological, social and relational. And the necessity of craft in education is even more important in the 21st century [17]. However, it is shifting to a more holistic craft process [14]. It is now regarded as practice-based research at different stages of development. Nimkulrat (2012) [12] makes the case for textile design. But it can be extended to product design, architecture, graphic design etc. It can be seen as children's form of research in shaping the material world, but also a design student or a professional's research into her/his own work.

Between art and technology. The digital Bauhaus [13]

The Bauhaus pedagogy advocated for an integrated approach between art and its contemporary technology. It was part of the curriculum there to study materials and fabrication processes and they advocated for a hands-on pedagogy of design. And even before the Bauhaus there was the Vkhutemas school in Moscow (acronym for Vysshieye Khudozhestvenno-Tekhnicheskiye Masterskiye - “Higher Art and Technical Studios”). It was governed by the same principles and many of its teachers also taught at the Bauhaus.

However in the twenties and thirties new technology was very different from what we consider now when we think of the term. New materials and production methods were invented back then. For example, ways of working with steel-tube, plywood or mass-produced glass. And this was reflected in the curricula. But as technology has progressed to digital approaches in nearly every aspect of our lives, so has the link between art and technology shifted. It is now very much linked with human-computer interaction. However, tactility has an important role yet to play in educating the new generations of designers [9]. And tactility can be aided by digital technology. So a new Bauhaus pedagogy would involve and even have at its core digital design [1]. It would integrate craft and digital technology for a contemporary understanding of design. It’s already developing but not as a singular project. It is formed of many initiatives from teachers and students in different places and contexts [7]. It is in this landscape of design education that post-processing on handmade models fits perfectly.

Experiencing form in digital design

Digital visualisations of design have very much changed the industry in recent years. New forms, possible only with the aid of the computer have appeared. Form is very much thought in relation to the way it can be shaped digitally. However, interaction with 3D digital models is mostly visual. Sometimes it can relate to time and motion, as in the case of animation, for example. But it isn’t a tactile experience as a real scale-model would be. That doesn’t mean that the two techniques (digital and analogue - hands-on) exclude each other. More and more they are being used together as tools in design education. Rapid prototyping is one of the current key developments in the design process. Digital models are being used not only to experience form, colour and lightning quickly but also to draft the analogue model using various digital cutting and printing techniques.

A problem regarding using digital methods in the design studio is the lack of expertise in this type of medium by the faculty [8]. Students tend to learn digital design through their own experiences and even when this developing of skills occurs for school projects, it isn't perfectly integrated. This leads to setbacks in learning. One of the most common ones is designing only in a digital environment and never double-checking in a material form.

Traditional and computer-aided model making. Rapid Prototyping

One method of counteracting this tendency is to require models, hand or digital made for design studio projects. Rapid prototyping techniques are becoming more accessible so model-making, even for students who are not so skilled in crafting, can be a facile endeavour. There are differences in regards to what is being thought through hand crafted models as opposed to computer-aided material models. But for the purpose of creating images and understanding space, the differences are smaller and we can take into consideration both routes in creating models.

Digital renderings

Nowadays, when we talk about images in the design phase of products, we mostly think of digital renderings. These are prevailing as they are easy to produce and contain only the visual information which can be easily understood. Usually, some simplified version of the resulting object is 3d-modelled. The best angle is sought and the most flattering light applied. The result are realistic or hyper-realistic images that represent an idealised version of how the final object will be [5]. They don't take into account the user's experience in relation to that object. But they can fool even the most experienced designers. And for those who are just starting to learn the principles of design this type of images can be even trickier. While the image may look perfect some underlying mistakes were hidden and only in the production phase do they become clear. This is why the relation to form, material, texture and colour taught by constructing models and playing with them is still important in design schools.

Not even virtual reality can replace the material model that can be touched, felt, altered or even destroyed. While it can result in a more immersive experience with the model there are still aspects that can be

missed. However digital renderings don't have to be completely dismissed. They have their benefits, but can be aided with more integrated approaches.

Photographing scale models

One of this approaches is through the use of photography. Models can be experienced from different perspectives, perceptions can be compared as photography is an excellent witness in the relation between model and student. But it's uses in design education are far larger, as an observing tool.

Photography in design analysis

Photography teaches design students composition and framing. It allows them to subtract a part of the world they are seeing in order to focus on it. It is an excellent tool for making meaningful observations. The designed object and the way it's being used can be analysed with photography. The students can learn from mundane or famous design objects. They can observe how these objects relate to the world and to the people that use or inhabit them.

But photography is also being used to analyse the students own work. It has the quality of being both objective and subjective, depending on the intentions. It can force a different perspective, like in the case of architectural models. Here the model is usually perceived as an object, viewed from above. Through photographs, different angles can be experienced. The building can be perceived as through the eyes of someone inhabiting it.

Space and form can be easily understood and altered if needed. Light and colour variations can be applied. Sometimes, like in the case of scenographic models this can result in poetic effects. Dematerialisation of space through light and its absence can be experimented and documented with photography on models. Also, the student can imagine how the space would be experienced in real life and how would someone inhabit or use it.

Photography for participative design

And when it comes down to accessibility, photography is becoming more and more available. Most students nowadays have in their pockets a smartphone that can take good enough photographs. This is an opportunity that should be used in design education. The selective process of

photography functions as a purpose in design analysis. Also, training the creative eye can make students see things in a different light. Photography is also being used in research that involves users as participants in the design process[18]. Students can get a better understanding of how the object performs in relation to the user by making use of the intermediation that the camera allows. And photography has been part of the integrated process of design also at Bauhaus, but with its contemporary technique. However, today, photography is more important and more present than ever. It's become one of the main ways by which we communicate [10]. In design education it can prove to be an effective way of communicating ideas between student, teacher and user.

Post-processing images

Representation using collage images isn't new, but digital technologies have made it easier and more relevant than ever. In the case of landscape design, Jörg Rekitke and Philip Paar [15] talk about montage techniques as early as the 18th century, before the term of collage was invented (attributed to Picasso and Braque). Today, digital 3D collages [19] are one of the main trends in design representations. Many students use photo-manipulation software like Photoshop or even smartphone apps to alter digital renderings and add parts of existing pictures, either well-known references or anonymous. This results in less realistic, more creative images. Sometimes, the ability to draw is also mixed in the collages, adding another layer of understanding. Drawing is still an important tool in a designer's education [6].

However, all this still remains at a strictly visual level. It is only through relating to a physical model by using photography that the student can find deeper meanings to these images.

Post-processing physical models - a cyclical process

W. J. T. Mitchell (2001) considered that we are now experiencing post-photography [11]. He talked about how photography has changed with technology and how we now perceive it differently. The term can be applied to our study. The student editing photos of his physical model is actually editing the resulted pictures with his own experience of the model, the object and the space. He adds layers of understanding from his experience to these renderings, communicating aspects that can only be felt through tactile interaction with the object. We can say that this process is a form of post-

processing on physical models. Moreover, the process isn't linear, each part influencing the others. The student can notice something in the final collages, something that he may be missed while interacting with the model. Or he may come up with an idea to improve it. He can always go back and edit the the physical model, adding or subtracting, altering parts etc. Or he can take another photograph that he may be missed the first time. All parts of the process (model-making, photography and post-processing) influence each other for better understanding of the designed object and for a more creative result.

The Workshop - methodology of a case-study

In February - March 2018, together with architect Teodora Ungureanu, we conducted a workshop, at the Ion Mincu University of Architecture and Urbanism. The participants were a group of about 20 first year architecture students. They were in the same design studio, with the same project. Their current school project required them to design a house based on a personal memory. At the time we started the workshop they were already in an advanced stage with their projects and had at least one scale model they were working on.

We divided the workshop in 3 steps, each lasting about 6 hours. In total, the workshop was about 24 hours long, split over a period of three weeks (each step in a different week). Every time, in the first hour we held a presentation with different techniques they could use. We discussed together images of models, both digital or built, both edited or raw photographs. We also highlighted the importance of the current step with examples from our own practice. In the following 5 hours they applied what they learned and experimented on their own projects.

The three parts of the workshop were:

1. Photography on scale models

The first part of the workshop dealt with photography as a medium to understand space, form and light. We experienced with both natural light and artificial, directional and coloured light. Human figures were added to show dimension and proportion. Some parts were masked to reveal only parts of the model. We played with technical aspects of the camera. Some chose to experiment with the depth of field while others tried really long or short exposure times to create movement. The students always worked in teams. One would take the photographs and be in charge of framing. Others would play with light or holding parts of the model itself. The background

was also important. They tried backgrounds that simulated texture or would complement the models and also backgrounds that could be easily removed or edited in a later, post-processing stage.

2. Post-processing

In the second part we took the photographs from the previous week and edited them either on laptops or mobile devices. The techniques varied from simple light corrections to collage and photo-manipulation. Our aim was always to help them express their project through the images. The fact that their projects relied on personal memories was also very helpful. They better understood the relation between form, space and the experience of living, in the spirit of Heidegger's comments on Holderlin's phrase: "poetically man dwells"[4]. Each experiment with the image revealed something about the model that couldn't be previously observed. The post-processed images had the power to express a way in which that particular space would or could be experienced. We also aimed to obtain more objective images, images that might come close to technical, rendered drawings. For this, we took deadpan[3] type of photographs that later could be further straightened to obtain images not deformed by perspective.

3. Analysing the images and creating a small brochure about the project

The final part required the students to take the images they previously worked on and arrange them in a small brochure about their project. They could also add text if they felt necessary. We proposed this task in order to make them analyse the images they produced both individually but, more important, in relation to one another. This part structured the information for more organised results. In addition, they created a finished product that would sum up our workshop.

We chose to split it this way, with the actual photography part just a third of the workshop, because we felt important that they also have the chance to analyse their work. Actually, the third part turned out to be the fullest as they started to work back and forth, revisiting the other steps. Most of them felt that they maybe needed to add another photograph or change something in a collage. Their project ideas became clearer because they had this new medium to work with - the printed brochure. They also used it at the final presentation of their school project, to show both concept and experience.

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