

ANALYSIS AND TRANSFORMATION OF WORKS IN DESIGN

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ABSTRACT

Based on analyses of architectural works, design engineer students are introduced to interpretation of well-known designers' works with the aim of giving them a starting point for discussing qualities of design. Such an analysis of a work has a different purpose than the design criticism which is used in design reviews and which rarely treats works of engineering that includes industrial design. The problem for the design students was partly that they found it difficult to translate the guidelines for analysis of architectural works into guidelines for analysis of design (artworks), and partly because the guidelines for design criticism, which also includes analysing works, do not give direction to the design process. Since the students have already been introduced to the analyses of architectural works, it is used as a starting point to develop a guideline for analysing works of designs and examine the conditions for a successful transformation of aesthetic qualities from an artwork to a new product. In connection with these studies master's students have investigated the meaning of terms used to describe the aesthetics in design. They did this as a part of the Industrial Design Section's learning and research strategy related to understanding the aesthetics in design. Guidelines for analysing works of design are established and overall transformation principles have been identified.

Keywords: Analysis of (architectural) works, aesthetic, analysing (art-)works, work of engineering.

1 INTRODUCTION

The purpose of introducing design engineer students at the Architecture and Design program to analysing works and studies of underlying design processes in the 2nd semester was to give the students the ability to analyse and understand aesthetic aspects of design. Based on analysing an original work, the students should make a suggestion for a transformation of the effects used in the work. The object was to integrate aesthetic qualities into a new product by using the tools and methods the creator had originally used. This learning strategy was included in the project "Analysis of Works and Transformation", which was completed by seven-person groups with the support of design supervisors and consultants, covering the scientific, technological and social aspects.

Based on analysing works and examination of underlying creating processes, the students were supposed to be able to:

- explain the main features of a given work of design, its context and its aesthetic qualities
- explain which effects, methods and solution strategies the creator either has used to create the work or in general uses in his or her practice
- translate the result of an analysis of work to qualities in a design specification
- reflect on the aesthetic qualities of own designs
- reflect on the identified methods utilised in relation to clarification of the design problem

The architectural aspects of the learning targets are omitted here as well as the demands for insight into the functional, constructive and productive aspects of the products, because these aspects are outside the study area [1].

The term "design analyses" includes in principle analysing work; but it rarely focuses on determining the aesthetic qualities that justifies the designation as work of art.

The framework for this program is an interdisciplinary learning approach that begins with an architectural project and courses that support this as well as the problem based learning approach. Despite the tectonic approach, the focus is on architecture as a work. In one of the courses, experienced architects analyse a number of architectural works and provide an insight into the

underlying sources of inspiration as well as contextual, spatial and functional analyses with the goal of giving the new students an understanding of architectural quality and a starting point for analysis of works [2].

Based on analysis of an original work and its genesis, the groups in the first semester had tried to create a work with a function given by the lecturer e.g. houseboat. In the following semester, the groups complemented their analysis of works with identification of methods and solution strategies used in the genesis of an original work. The aim of the latter was to introduce students to the methodical and systematic solution strategies which they would meet in the following semester as a means to reach a timely solution also when the intuitive approaches are not sufficient. The groups were free to choose whether the original work should be of the type of architecture, design or urban design that corresponded to the theme of their project, which meant that part of the group's analysis an architectural work as a basis for design.

The objective of the common learning strategy in the first year of studies is to provide the students with an interdisciplinary foundation. The program admits about 120 undergraduate students and about a third of these choose the industrial design from the third semester.

For these design engineer students this learning approach raise issues like:

- What characterizes works created by engineers / designers - (works of engineering/ artwork)?
- Which aesthetic qualities does industrial design have that justify the label as artworks?
- What does an analysis of works consist of when the type are work analysed is a work of engineering includes industrial design?

The present study considered industrial design as a kind of engineering because the educational framework for the three specializations is a Science in Engineering.

For the educators at the specialization in industrial design, the learning strategy raises some dilemmas concerning:

- Establishing guidelines for analysing works that are both normative and open enough to include new or newly perceived aesthetic quality about works of engineering.
- Relating the aesthetic to something that affects human well-being or relating the aesthetic to something that gives people unique experiences (attractive or repulsive).

A future guideline for analysis of works for engineer students must for example be able to articulate the aesthetic qualities of the mechatronic product that people experience in the interaction with the product more than through the visual experience of the product.

This paper presents the results of a comparative study of student reports from the period 2010 to 2013 and the theories which the students were presented to as an introduction to analysis of works. In 2014 a new curriculum was put into effect which replaced the project "Analysis of Works and Transformation" with a purely industrial design project; namely the project "Product and Process". In this project, the rotation analysis of works in relation to design was discontinued. The changed learning strategy has revealed that the degree to which the ability to analyse works helped design engineer students to understand the aesthetic quality of industrial design has been underestimated. This raised the need for studying what an analysis of work generally must contain in relation to design and if possibly point out its learning qualities in combination with exercises in transforming the qualities of original works.

2 FINDINGS METHODOLOGICAL APPROACH

The theoretical approach to the analysis of works has been based on some key sources which supervisors and consultants have supplemented with literature which they found relevant. This study was based on these key sources and what the analysis of architectural works should contain according to them; see section 3.1. Three of the program's architects have commented and contributed to a clarification of the guidelines for analysing architectural works. This approach to the study was chosen because the students are still introduced to analysis of architectural works before design and one of the goals of the analysis is to give the creation process a direction. Therefore this analysis differs from criticism of art or design where the aim is to review design or establish a historical categorization.

Based on the analysis of architectural works, a proposal was written for what an analysis of works should contain in relation to design. Seven supervisors and consultants associated with the design program were asked to comment on this proposal. The detailed guidelines for analysing works of

design were subsequently compared with the analyses of original work of design in the design engineer students' reports.

Six students in the third semester of the master's program, who themselves had worked on this analysis in their first year of study, helped to examine how the terms used in the analysis of works such as poetic, humorous and thoughtful or thought provoking is reflected in design. The aim was partly to collect easily understandable exemplification of aesthetic terms and partly to begin an identification of design strategies underlying the creation of aesthetic expressions in design.

3 ANALYSIS OF WORK

In 2012 the leader of the Architecture & Design Board of Studies, Henrik Harder, questioned the scientific quality of the sources on which the students had based their analyses in the latest set of reports. Harder therefore asked three educators from architectural design, industrial design and urban design each to select seven works from their scientific field based on aesthetic quality and availability: In addition the educators should ensure that there was an opportunity to provide original sources and if necessary opportunity to interview the creator or someone who knew about the use of methods and solution strategies. The description of the works could be based on a phenomenological and body-perceptual approach as a point of departure for objective registrations of the qualities of work. The works and their context were analysed on the location for which it was created or in the museum where the works were on display at the time.

3.1 Theoretical Foundations for Analysis of Architectural Works

The analysis of the architectural works has been based on Lise Bek's and Henrik Oxvig's, "Space analysis" [3], Niels-Ole Lund's "Architectural Theories since 1945" [4], Sven Hesselgren's "About Architecture" [5], Steen Eiler Rasmussen's "About experience of architecture" [6] and Erik Nygaard's "Architecture understanding" [7]. Therefore, the identification of the aesthetic qualities was directed towards [2]:

1. Architectural style - style period
2. Formal consideration - geometric structure, formation of rules
3. Phenomenological consideration - experiential statement
4. Semantic consideration - content of meaning in a civil, historical context
5. Organizational consideration – sharing of functions and configuration of buildings
6. Tectonic consideration - constructive and material aesthetic construction

In the first year the students learned that the work must be analysed on the basis of the cultural, social and historical framework that the building was created for. This phenomenological analysis should teach students to recognize the connection between the effect of the building and its expression.

3.2 Analysing Works of Design

Across the three disciplines, the focus was moved from people as passive observers to active interacting people in space and with products by presenting a selection of the considerations in "Public Space 1 & 2, The Strangers in the Knowing" [8], [9] in combination with a practical exercise in perception of sculptures and street furniture in Aalborg.

From these experiences, guidelines for analysing aesthetic qualities of design were identified as:

1. The style the design present (a period/direction/style of location - peoples imprint)
2. *Qualities of work compared with qualities of other product in the same category*
3. The cultural and/or social life the product is used in - the cultural and social frame of reference
4. The context (climate, sound and lighting, smell, product placement in space/infrastructure/ nature and in relation to other products) – the contextual reference frame
5. Effects of the product on humans / observer (related to the impressions of the senses)
6. Expression of the product (*the main features* and the used effects to emphasizes its expression , described with reference to the proportions, symmetries, rhythms, lines, textures, textures, colours, etc.)
7. If possible, the product's interaction with the system it is a part of.
8. If possible, the interaction effect on human / actor (the human's mind and the body's impression)

Point 2 and the addition to point 6 about the main features are a result of the feedback from the seven supervisors and consultants. A comparison with other products in the same category can clarify the preference of the works - whether it is aesthetic qualities, style, material aesthetic, construction, sound,

smell or anything else. A focus on the main feature instead of details can help the students to get an overall grip on their own design. Point 8 also includes experience in the handling of non-interactive products described by Mattozzi [10]. Point 2 has not been entered into the applied analyses of works, therefore it is not included in this study. Points 7 and 8 are first introduced to students in the 4th and 5th semesters. These points are only included in the guidelines to present the analysis of works in its entirety.

3.3 Terms in Analysis of Work

A dilemma between design engineer students' interests for products created by designers from artistic educations and their need to describe the aesthetic quality of works of engineering meant that the choice fell on the terms related to distance perception. Unlike Shusterman's Somaesthetics [11] and Van Poolen's considerations about the aesthetic experiences that works of engineering can give people [12] related to perception in use of products, the students simply use photographs of products as objects of communication in their study, although that is not optimal for distance perception either. Studies of related design strategies consisted of testing Ludden's, Schiffer's, Stein's and Hekkert's six strategies [13] and Lin's, Lin's, Chen's and Lin's [14] approach to the poetic design.

Overall, the terms poetic and humorous associated with product development are respectively based on the principles: "form follows idea" [15] and "form follows fun" [16]. In design "form follows" means that "the product development is guided by" these aesthetic aspects and the term "form" includes interactive products. Determining which overall product development strategy the terms "thoughtful" and "thought-provoking" are associated with, resulted in a discussion. In aesthetics "thought-provoking" describes the design that was deliberately created to provoke people's senses or possibly change their behaviour. For example the bookshelf designed by John Leung (figure 1.a) and a nudging product such as Electree designed by Mathias Botfeldt (figure 1.c). In aesthetics "thoughtful" describes the design which is organized or constructed so it appeals to our intellect as for example Pivto designed by Steen G. Christensen and Erling Andersen (figure 1.b). That could justify a general development principle as follows from emotional appeal or intellectual appeal with associated design strategies. Future studies should be directed to investigate whether David Favrholt's criteria "Emotional Appeal" and "Intellectual Appeal" is suitable to describe or define work of engineering before the proposed development principles are put into use [17].



Figure 1. a: Bookshelf, b: Pivto and c: Electree

The participating master students who contributed to the study by exemplifying the importance of the discussed terms showed that participation in such studies acts as a learning strategy in relation to own understanding of the aesthetics. It is still too early to say whether the identified strategies to create products with aesthetic qualities could work in practice or support transformations.

4 TRANSFORMATION

Working within the industrial design field, the groups were able to develop different types of concepts, ranging from design and equipment for squares, waiting areas, playgrounds and gaming areas as well as ice skating rinks to organization of and equipment for festival tent camps. The groups who chose to develop one of these concepts experimented with creating a new product by using the same methods and solution strategies that they identified the designer as using. At the same time they tried to integrate the decoded effects in the concept and meet the design specification requirements and wishes. In accordance with the learning strategy, the inception of the objective aesthetic demands and desires was exemplified by describing or illustrating the perceived/experienced phenomena through the means of the decoded effects. According to Bundgård this is the philosophical way to objectify the aesthetic [18]. In the next step of the transformation each group attempted to clarify the main features which illustrate a form idea, explain the interaction and construction principles and overall dimensions

of materiality, colours and textures of the concept. In the last step of the transformation, the students made a diagram for the organization of the form elements in the concept. The diagram makes it probable that the elements can be assembled in an appropriate manner for the production and compilation. The transformation thus reveals whether the students have understood how to identify, document and transform the aesthetic aspects.

4.1 Study of Design Engineer Students' Analyses and Transformations of Works

In the following, it will be examined whether the groups have articulated point 1 and 3-6 in section 3.2. Due to Harder's focus on improving the scientific approach in analyses of works in 2012, the study was based on reports from that year. The groups managed to identify the aesthetic qualities and achieve the transformation principle shown in table 1. It must be recognized that the major focus on identifying the use of effects leads to regeneration rather than to transformation. This is evident when comparing with Nijkamp's and Grade's model for translation [19] where the term "regeneration" means that the semiotic characteristics of original work are more or less directly integrated into the new product, while a transformation requires an interpretation of these characteristics. A comparison of the analyses of works in 2012 with the years where students were free to choose works for their analysis of works shows that it is very important for the quality of learning that the selected works have significant aesthetic qualities – or are at least recognized as classic design. Mentioning classic design leads the students on the trail of the aesthetic qualities, if they cannot experience them directly. The reports also show that a substantial part of the learning experience lies in the experience of the work and in interviews with its creator. From the reports it is evident that the consultants have been very adamant that the interview frameworks were to be developed based on available literature. The list of selected works included a bus shelter designed by architect Knud Holscher, a bus shelter designed by architect Teit Weylandt and a shelter on DSB's platform for which design director Jesper Jul Mørch was responsible. These are examples of time-typical solutions established in many Danish cities and created by known Danish architects / designers. It must be acknowledged that this did not make these shelters suitable objects for analysis of works, as the completed analyses of works did not result in a transformation principle of the type for example form follows function.

Table 1. Analysis and transformation of works to a waiting room or shelters

Original work	Creates	Type of Quality	Qualities	Transformation
Telephone box "Question Mark"	Klavns Helweg-Larsen	Metaphorically	Sculptural Character filled icon	Form follows idea
12/16-edged Climate Tent	Bent Hindrup Andresen	Reinterpretation	Recognizable symbolic reference	Form follows history
Cadomus The shelter "Mushroom"	Poul Cadovius	Organic/living expression	Sculptural organic	Form follows nature
City-bench	Nanna Ditzels	Patterning/Bionics	Combination of shadow play/wind punishment	Form follows story telling [20]

In 2013 where all 18 groups had to develop concepts for equipment for festival tent camps, they could choose between original works in the form of buildings or building complexes. This meant that the design engineer students' analysed architectural work as the basis for their concept development. In particular point 2 in the architectural analysis of works about formation of rules helped the students to identify the main features and challenged their ingenuity to transform these principles into mobile and often collapsible spatial formations of light materials. The architectural analysis of work functions as the students' learning platform when it is possible to transform the organizing rules or principles of construction of the original work into a product. This shows that if the product the students have to develop a concept for belongs to the same product category as the original work, then the students can transform some of the effects and express something aesthetic. Through the transformation, the students at best experienced the importance of having a clear main feature for the development of a product. Alternatively they experienced that their design was incoherent.

5 FINDINGS

The study clarified the guidelines in analysing works of design as shown in section 3.2. The learning strategy: "from analyses of an original work through transformation of the main features and effects into new product" requires that the coordinator/supervisors select objects - works of

design/architecture - with distinctive aesthetic qualities. It is central for the learning that students get experience with the work and its creator. When using general transformation principles of the type form follows "something", the students of the second semester can identify when the original work belong closely related objects. The transformation principles in Table 1 were so effective in giving direction to the creation process that they themselves should be highlighted as an approach for solving design problems. This study can only conclude that the master's students' exemplary aesthetic terms can support learning at this level, but not if 2nd semester students can use such an example as the starting point for their argument for the connection between an aesthetic concept and the effects used.

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