# RESEARCH ORIENTED PROJECTS ON DESIGN THEMES – A MASTER SEMESTER AT AAU

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**ABSTRACT**
How can design students do research-oriented projects about design themes? At the 3rd semester at the Industrial Design Master Program at Aalborg University this is done by taking research oriented learning objectives on design theories and methods and combining them with experimental case studies with or without external parties like companies and consultancies. Programming the project is a large part of the 2½ month long project work and a "program" is handed in and evaluated after 3 weeks. During this programming the design students are going through a pre-reflection process, where they are designing the setup including the experiment or case that they will be carrying out. This approach shares characteristics of a regular research project, but the extent and level of complexity is much lower and the experiment and case is larger part of the project. At the other end of the project the analysis and discussion of the project is also significantly less in extent and complexity. This paper will use four case projects to demonstrate the variety and range of projects carried out under this research-oriented semester called "Research & Strategy". Even with a variety in extent, context and structure they all meet the learning objectives and the output of the projects are beyond ordinary design proposals, instead they are centred on methodological issues and suggestion for improvements providing collaborating partners with valuable insight and feedback. At the same time the scientific attitude and professional self-reflection amongst students are improved.

*Keywords: Design research, scientific attitude, programming projects, report structure*

## 1 INTRODUCTION

### 1.1 Improving the scientific attitude amongst students
At Aalborg University the Faculty of Engineering decided in 2007 to enforce a focus on research throughout all education programs at the 3rd MA semester to create a stronger link between MA programs and PhD programs. This lead to a minor adjustment in the learning objectives for the Industrial Design programme 3rd semester main project module on 25 ECTS including an integrated 1 ECTS paper writing course and 2 ECTS Design Research Methodology, Theory and Practice.
The learning objectives are primarily concerned with the ability to plan and reflect on experiments or cases, such as the ability to:
1. analyse a theoretical or methodological problem within the professional field of the specialisation
2. account for relevant theoretical positions and related methodologies pertaining to the chosen subject
3. evaluate and assess the research problem in relation to completed investigations and/or experiments and use this as a basis for synthesizing proposals for quality designs
4. reflect on the test result in relation to the field and activities of the profession
5. communicate results or partial results of the project work as professional research.

Only 0,5 out of 5 learning objectives involves synthesising a proposal making the semester significantly different than the rest of the curriculum for design students in terms of learning objectives in the framework. However the project and practical work throughout the semester may not be all that different after all. First of all the design students are already accustomed to semi scientific

reporting on their design projects emphasising the use of methods and the progression of the design process [1]. Second the 3$^{rd}$ learning objectives points toward and experimental approach, which is in line with the notion of design being suggestive abduction (Peirce in Cross [2]) and suggesting solutions as a inherent part of the process [3] which is already integrated into the approach of the Industrial Design curriculum.

Compared with the NTNU approach to design research at their 9$^{th}$ semester [4], the Industrial Design programme at Aalborg University the practical design project has more weight at Aalborg University: 22ECTS versus 15 ECTS at NTNU. And vice versa the theoretical weight is higher at NTNU; 7,5 ECTS versus 3 ECTS at Aalborg University. However the learning objectives are similar concerning the combination of theoretical foundation for a design project, test or verification setup of the project (learning objective no. 3).

With the main focus being on the practical approach compared to NTNU and a project module with self-chosen subjects and the possibility to collaborate with researchers, companies and taking the semester as a traineeship it calls for specific guidance for each students or group of students.

Besides the role of supervision "Programming" is used for individual planning of projects.

## 1.2 Programming creates pre-reflection and direction

Programming a project is used for all Project modules at the Master program, at the 3$^{rd}$ semester it is a large part of the 2½ month long project work and a "program" is handed in and evaluated after 3 weeks. During this programming the design students are going through a pre-reflection process, where they are designing the setup including the experiment or case that they will be carrying out. Furthermore central theoretical or methodological aspects are to be studied providing the student the vocabulary and theoretical framework for carrying out the experiment and perform the proper documentation. It forces the students to a reflection on their actions [5] by asking for alignment between question, method, main theories and data that can be used continuously throughout the project.
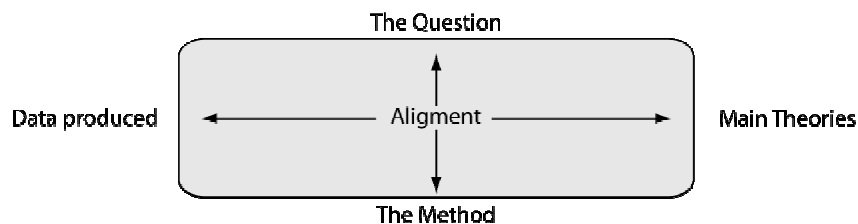


*Figure 1. Alignment*

The program is comprised as a minimum by the description of; Problem Field and subsequent relevant themes, Problem statement outlining the main focus, Approach and Methods, Delimitation and Timetable. Furthermore central theoretical or methodological aspects are to be studied providing the student the vocabulary and theoretical framework for carrying out the experiment and perform the proper documentation This can be supplemented by further descriptions of themes, subthemes, etc., which also can be placed in appendix.

## 2   PROJECT SETUP AND REPORT OF DESIGN RESEARCH?

Even though one can argue the similarities previously mentioned regarding reflection ability and process reporting, the shift in focus from designing products or services to producing knowledge raises a number of concerns for design students; how do we structure this open project with self-chosen subjects? How can this be combined with collaborating with companies? How can this be combined with traineeship meeting the same learning objectives? What can a design research project be about?

The learning objectives provides some clue to the overall structure; first of all the ability to analyse a central theoretical or methodological problem (no.1) indicates the students must choose and analyse a theory or method within their field of expertise. Combined with the ability to account for relevant theoretical positions and related methodologies (no.2) it requires that the student can describe a problem field and explain the (most) relevant theoretical positions related to the problem under investigation.

The ability to evaluate and assess the problem in relation to completed investigations/experiments and use this as a basis for synthesising proposals for design (no.3) indicates that the setup of the project

involves an active experiment and design of something similar to a "normal" design process for the students. The ability to reflect on test results and relate them to the field of profession (no.4) request direct link between the question, the experimental setup and results of these and a discussion on whether these results adds to the existing knowledge. The final ability to communicate results as professional research can either be related to the paper workshop or a request for rigidity in the report. The first learning objective also points toward the most usual subjects to deal with in the projects, namely processes and methods. It might be a result of the training of students in rigorously reporting design processes [1] and the overall approach of the program that design process is the focal point and perceived as leaning towards a glass box rather than black box object [6] that they pursue a deeper understanding of how methods works in various contexts.

## 3 FOUR CASES OF PROJECTS

This paper will use four cases of 3rd semester reports from the Industrial Design Program so demonstrate the variety in context, structure, research questions and main findings of the projects. The projects have been carried out under different circumstances; own experiments using a company as case collaboration and tests with companies and trainee ships using the company approach and methods as focal point. For each project report the various chapters has been used as an indicator for the structural emphasis in the project between active parts (experiments and proposals) and theoretical and reflective parts (programming, theories/methods, analysis and discussions). The quantitative division seems a fair indicator for the structural setup considering the extensive experience with process reporting amongst these design students [1], but this is only used cautiously and must be related to the actual questions and findings within the projects.

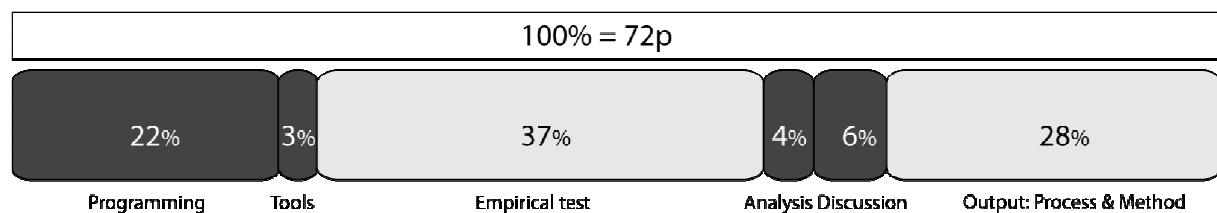### 3.1 Case 1: Front-End ABC Methodology

Figure 2. Case 1, report structure.

Project setup and approach for "Front-End ABC Methodology" [7]: The project was about improving the idea development process in a production company. The group was located at University campus using a well-known Danish company as case for general method and process improvement based on Koens NCD model [8] and a stage-gate approach. Final "test" of their proposal was conducted as a 3-hour discussion session with representatives from the case company.

Main question investigated: "How can a methodology for the Front-End effectively transform ideas with a clear intention into concepts highlighting the business potential and with reduced uncertainties?"

Main conclusions in the project were concerned about the use of the suggested methodology. Structured by components in the question, they are:
1. Clear intention: "…Gate A and Gate B ensures that only ideas with a clear and meaningful intention for users will proceed all the way through the different phases…"
2. Effective transformation: "We have with our test shown that the Front-End ABC Methodology can be used to take ideas all the way from one-line idea into a clearly defined concept".
3. Highlighting business potential: "The experience from the test show that the methods only work as discussion tools and not as tools to directly decide which concepts to proceed with".
4. Reduced uncertainties: "For the two methods to be more effective…suggested that each listed uncertainty is followed by a proposed approach on how to solve it."

The project spent approximately 65% of the reporting on empirical test and describing the methodology they designed. The main output was both reflections on how well their methodology worked related to the company case and a "handbook" like report on the methodology it self.

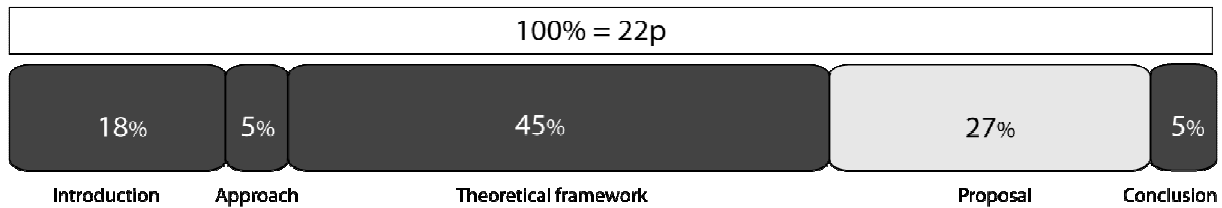### 3.2 Case 2: Interfacing a Strategy



*Figure 3. Case 2, report structure.*

Project setup and approach for "Interfacing a Strategy" [9]: A project carried out as trainee at a design studio abroad. The project focus is on method development for communication of design decisions. The report was structured as a paper, not a traditional process report.

Main question investigated: "How can the morphological maps be improved, changed or supported to enable the design team at Inoda+Sveje to work with and clearly as well as explicitly communicate internally and externally about the strategy in a structured and methodical way?"

Main conclusions in the project revolved around the use of morphological maps as a strategic tool and service that the design studio could provide:

"…selectively utilize strategic elements according to their capability, experience and project at hand." and "…as a digital tool it could easily be as flexible as the current morphological map used at Inoda+Sveje."

The project spent significantly less space on actual proposal (27%) and placed a large emphasis on the theoretical framework (45%). The output of the project was both a suggestion on how to utilise a tool selectively for strategic purposes, as well as suggestion for how to improve the tool it self.

### 3.3 Case 3: User-centred design; Process, Method and Strategy
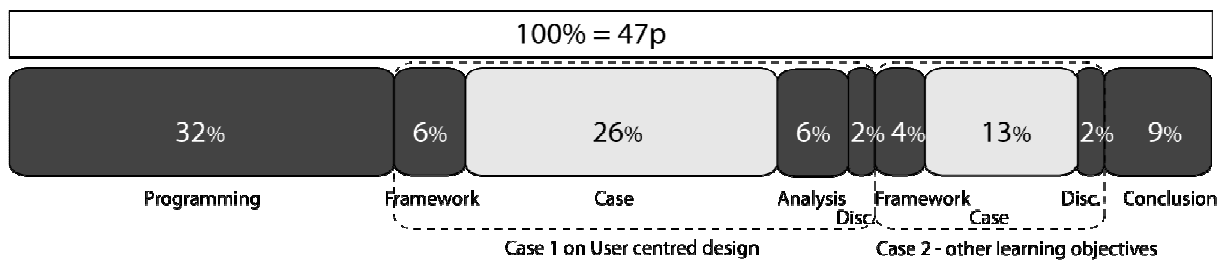


*Figure 4. Case 3, report structure.*

Project setup and approach for "User-centred Design; Process, Method and Strategy" [10]: The project was about investigating how user centred design was practiced and influenced a design studio in Denmark, where the design student was a trainee. User centred design theory was used basis for analysing projects carried out as part of the traineeship.

Main question investigated: The motto "form follows interaction" – how does that influence the process and user involvement at the design-company?

Main conclusions in the project"…the motto is, as the case indicates, primarily utensil interaction." "In the case they do not work with the user as a social actor." "The case shows that in their research and work primarily focus on the use, not the life-world. Furthermore the degree of user-involvement is between indirect and direct."

The project spent a little more than 50% on frameworks and discussions. The actual output of the project was a description on how the company used user centred design supplemented with short recommendations for future improvement based on the rigorous unfolding.
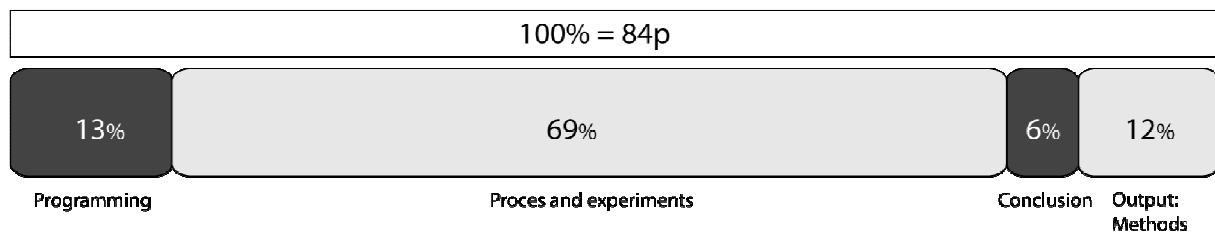
## 3.4  Case 4: Consolidate



*Figure 5. Case 4, report structure.*

Project setup and approach for "Consolidate" [11]: A project carried out by a group located at campus using a couple of companies as sparring partners for testing throughout the project. The main focus of the project was to develop a tool for improving strategic use of design based on strategy theories and tools, such as the Strategy Diamond [12]. The report structure is similar to a normal process report in the programme.

Main questions investigated: A. "How can the designer through a workshop create a shared understanding of the company strategy amongst participants?" and B. "How can the information about the company strategy form a basis for the development of a product?"

Main conclusions in the project were related to the role of a physical object in the strategic discussion and the relevance and use of the output of the suggested game:

A. "The physical game contributes to the fact, that participants focus on the same task" e.g. "pointing at the theme there are talking about", "This means that participants through discussions achieve agreement on topics, previously not discussed." "Based on feed back from the company, we can conclude that the project teams perception of the company's strategic situation is coherent with the company's own perception. Thus shared understanding has been achieved"

B. "The type of information produced through the workshop provides the participants with an improved knowledge on the company's goals, strategies and visions." and "…provides insight into the constraints and opportunities in relation to product development". "Afterwards, the Design can help the company to generate a design brief for the product to be developed".

The project is mostly focused on hands-on method development (game) with interaction and test with companies (69%), with less emphasis on the theoretical framework and discussions. The main output of the project was a board game designed for the dialogue between design consultants and companies. Furthermore the tests with the companies provided them with relevant strategic discussions on a new platform.

## 4   RESULTS OF PROJECTS FOCUS ON METHODOLOGICAL ISSUES

The cases shows a variance in the emphasis put on programming and reflection activities in the projects ranging from 63% in a paper structured report to 19% in a traditional structured report. However all investigated questions points towards investigating design methods and tools with the objective to improve their use. For some cases the theoretical framework is an individual part of the report, others have it integrated into the programming of the project, indicating the interest and "level" of scientific orientation by the project group.

Regardless of scientific level and report structure all projects delivers and output beyond a normal design project in terms of method improvement, either as suggestions or as development of tools and methods. Furthermore the main findings in the projects all reflect on the use, relevance or impact of using specific design methods. Even though the project context varies from studio-based traineeship to campus based method development, it is possible to generate a case, or experiment, useful to analyse and reflect upon in relation to learning objectives.

## 5   CONCLUSION

No matter the circumstances and context of the students' projects it is possible to achieve the same learning objectives and maintain roughly the same structure of the project and report; Programming – case – analysis - discussion. To some extent this structure simulates a micro-PhD thesis, but with significantly less complexity and slightly less rigour. The variance in the cases lies within the weight

given to level and extent of the reflections, both pre-reflections, reflection in and on action. But in all cases there is attention on the scientific value and approach to generate the empirical data and analyse these.

The alignment activities in the pre-reflection of programming the project is used in all design projects within the curriculum already, but the shift of focus in production from design objects to methods, further accelerates and enhances their awareness of how and why these methods works. Thus improving their scientific attitude without a major change in the rhythm of the project.

The location of students seems to make no difference in terms of scientific attitude; actually case 2 demonstrates that a paper output format made the theoretical framework the most significant aspect (almost half of the project report). If the focus is maintained and cleared with the external partner the results of the projects does offer the external partner something new and knowledge and perspectives they either did not think of before, or were able to put resources into developing.

Having learning objectives so closely related to research and investigations forces design students to become very aware of both the field of design, how it is practiced and what their own role in the development process is. Combining this with an internship even further accelerates this self-reflection and reflection on methods, processes and approaches within design. A reflection that otherwise would be among the first experiences when working as a professional.

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