MAKING STUDENTS' FRAMES EXPLICIT

Louise MØLLER[1] **and Poul Kyvsgaard HANSEN**[2]
[1]Associate Professor, Department of Architecture, Design and Media Technology
[2]Associate Professor, Department of Mechanical and Manufacturing Engineering

ABSTRACT

Framing is a vital part of the design and innovation process. Frames are cognitive shortcuts (i.e. metaphors) that enable designers to connect insights about i.e. market opportunities and users needs with a set of solution principles and to test if this connection makes sense. Until now, framing has mainly been explored as an implicit and intuitive process, where the project framing emerges as part of the designers' on going reflection. However, in an educational setup the implicit and intuitive nature of the framing process is an issue.

Previous research on frames in an educational setting shows that the quality of team projects is correspondent with the number iterations of the project framing. However, there is no research that point to how more iterations on the project framing can be created, or how we as supervisors/teachers can support this process.

This research project explores the effect of encouraging students to make their project frames explicit during the development of a conceptual design. The students were divided into two different groups. The first group made notations on their framing process (either occasionally or everyday) the other group did not. The study did not show any remarkable difference in the grades between those students, who made their framing process explicit and those who did not. However there was a noticeable difference in both the way and depth in which students with high grades continuously developed and reflected on their frames (as part of the process) compared to those who got a lower mark.

Keywords: The framing process, conceptual design, design education.

1 INTRODUCTION

The concept of frames has been explored and unfolded in various fields of research [1–3]. In general, frames are defined as cognitive shortcuts that help people make sense of complex situations. In design, frames are defined as *'the underlying structures of belief, perception and appreciation'* [4] and framing as a process of sense making [5], [6] that allows us to 'see things as' [7] or to create specific object worlds [8]. Frames are often communicated through storytelling [9], [10] and metaphors [11], because these allow us see things in a certain perspective. Even if frames are often paraphrased as simple metaphors, they are typically quite complex units, that provide the designer with implicit assumptions about: 1) the project's values and goals 2) the relevant issues 3) boundaries to the design situation and 4) criteria for evaluation [12]. During a design project, frames can be tested, rejected, refined and nuanced, but the frames still enable the designers to navigate, make decisions and make progress [13]. The most influential studies on design frames is Donald Schön's theory on reflective practice [7]. The reflective practice theory build substantial insights into how designers (as individuals) reflect-in-action, reason and make progress in the design projects [14]. Numerous studies have built on Schön's perspective on framing and characterized the framing process as individual, implicit and informal process based on abductive reasoning and tacit knowledge [12], [15]–[17].

1.1 The framing process

The challenge in design is that designers may not know exactly 'WHAT' they are designing or 'HOW' the product is going to work. To overcome this challenge, designers suggest a frame that connects aspired value (i.e. a user need) with a set of solution principles; and then test if this frame makes sense either through research or prototyping [18]. See figure 1.
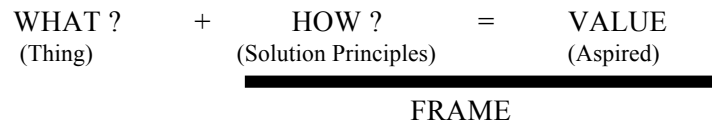
WHAT ?   +   HOW ?   =   VALUE
(Thing)   (Solution Principles)   (Aspired)

FRAME

Figure 1. Illustration of a frame (based on illustrations from [18]*)*

Frames enable the designer to engage in a process of abductive reasoning and sense making [19]. The framing process typically happens in loops of three steps: 1) suggesting a frame, 2) testing the frame through research or prototyping and 3) then reflecting on the outcome of the research/prototype as well as on how this outcome changes, rejects or refines the project frame [16], [20]. Based on this a new frame is suggested. (See figure 2.)
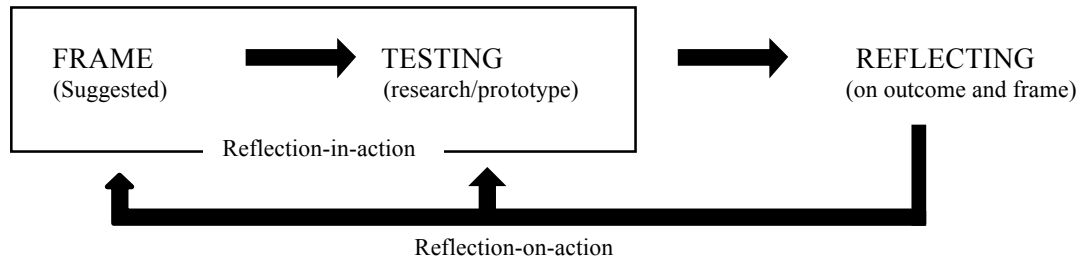

FRAME (Suggested) → TESTING (research/prototype) → REFLECTING (on outcome and frame)

Reflection-in-action

Reflection-on-action

Figure 2. Illustration of a framing process (based on [16], [20]*)*

In the first two steps of the framing process, the designer applies reflection-in-action [7]. This means, that when the designer develops and suggests a new frame, he will unconsciously apply frames or elements of frames used in previous projects or frames from inspirational products [4], [7]. Likewise, when the designer starts testing the frame, he will unconsciously apply approaches that have worked well in previous projects, for instance, searching for themes, underlying problems or paradoxes [17], [21]. During the reflection step, the designer is engaged in a more conscious and perhaps even articulated reflection-on-action [7]. However, as figure 2 suggests, the majority of the framing process is an implicit and informal process based on the individual designer's previous experiences and tacit knowledge.

1.2 The framing process in design education

Since the framing process is central to both the design and the innovation process [18], [22], it is also important that design students become able to manage and practice it. Some would argue, that the framing process is taught throughout the students' design educations i.e. through the interaction between the students and supervisors, from experience of various design projects etc. This may be true to some extend. The question is whether these students are aware of the importance of this ability, if they are able to further develop it; if they can apply the framing process when they collaborate with others (perhaps non-designers) and if they can articulate enough about their framing process to be understood, both during the process as well as argue for the value of it, when the frame has been developed. In an educational setup the implicit and intuitive nature of the framing process is an issue. For instance if the student's framing of the project is implicit, it may be difficult for the student to change or nuance the frame, as well as to present it to others and have valuable feed-back on it. Likewise, if the framing of the project is implicit, the student may not be able to connect the supervisor's comments or critique in relation to the framing of the project, but merely take it as suggestions or critique of the project, without being able to act on it.

Previous research on frames in an educational setting shows that the quality of team projects is correspondent with the number iterations of the project framing [16]. However there is no research that point to how more iterations on the project framing can be created or how we as supervisors/teachers can support this process.

This research project is build around the challenges concerning implicit frames and the potential of increasing the number of iterations of the project framing and thereby increasing the quality of the

project. This research project explores the effect of asking students to make their project frames explicit and document their framing process every day during the development of a conceptual design. The study is build on the assumption, that if students make their framing process explicit and document it regularly, it will encourage more attention to the framing process and thereby create better frames and projects. Furthermore, the aim of the study is to explore if there is a qualitative difference between those student with a high grade and a low grade – in terms of how they handle and document their framing process during the project.

2 METHOD

The empirical data for this study comes from Industrial Design education at Aalborg University and more specifically a five ECTs course called: *Advanced integrated design: Pre-phase.* The aim of the course is to familiarise students with theories, tools and methods required for the early phases of the design and innovation process, in which the focus is on "what to design" and "why" in terms of specifying both product, context and use of product. One of the central books in the course is: The Delft Innovation Method [23]. The course also includes an initial introduction to business model generation [24], product market positioning, value proposition, and the relation to the client company's brand and market position.

The course is linked to the semester project, which includes close collaboration with an industry partner. The industry partner provides the students with an assignment (typically an open-ended assignment with focus on future products, new markets or application of new technology etc.), and the student act as design studios during the semester. The semester project is conducted in teams.

The Pre-phase course is positioned before the semester project and the students work individually on the pre-phase challenges in the industry assignment. The students participate in lectures, group supervision as well as individual supervision. After an intense four-week-period the students hand-in a conceptual design and the argumentation behind it – in the form of words, illustrations and models:

In fall 2015, 43 students participated in the course and 14 students volunteered to be part of this study. The industry partner was a Danish office furniture developer and manufacture. In figure 3, there is an example of what the student hand-in.
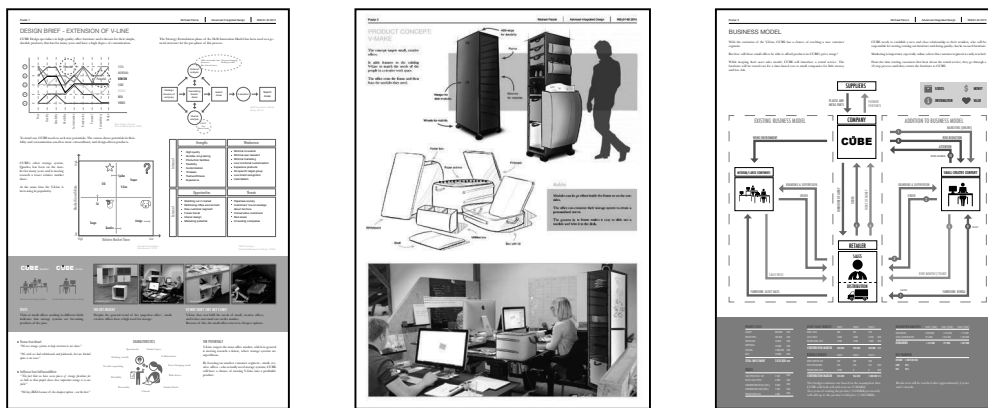

Figure 3. An example of a student hand-in

During the development of the conceptual design the students, who volunteered to participate in the study, were encouraged to make their frames explicit. This was done by introducing the students to the basic framing theory and by providing the students with a 'working-template', which illustrates the framing process. The template included following steps:

1) Name the relevant issues in the design situation *(What are you trying to find out?)*
2) Frame the problem in a certain way *(How do you see/understand the issue/situation? why?)*
3) Move towards a solution *(What will you do to get to know more about the issue/situation?)*
4) Reflect on those moves and the current frame *(What did you find out? Is the frame still the same?)*

The volunteering students were divided into two different groups. The first group made notations on their framing process every day as a sort of diary (they filled out a template every day), the other group made notation on their framing process every time it seemed meaningful in the project. There

were 7 students in each group and the students were randomly positioned in the two groups, based on whether they were sitting in the left or right side of the classroom.

After four weeks of working on the conceptual design the students handed-in a presentation of the conceptual design with argumentation behind it (see fig. 3); and eventually it was graded. The students who participated in the study also handed in their documentation of the framing process.

3   ANALYSIS AND FINDINGS

As mentioned earlier, the study builds on the assumption, if students make their framing process explicit and document it regularly, it will encourage more attention to the framing process and thereby create better project frames and projects. However, this study is not able to substantiate this assumption. If one compares the average grade of those students, who volunteered to actively document the framing process (by documenting it either everyday or at significant points in the process) with those student, who did not document it, the difference is quite small. The students, who documented the frame, got an average grade of 7,49 on the Danish seven-point grading scale (which is just above C on the international ECTS scale) whereas the students, who did not document their framing process, got an average grade of 6,65 the Danish seven-point grading scale (which is just below C on the international ECTS scale). The numbers indicates that documenting you framing might have a positive effect on the result of your project, but the small difference between the two groups makes it impossible to draw any final conclusions on this matter.

Another indirect aim of this project was to explore whether the frequency of the documenting the frame had any influence on the quality of the students project. Based on the evidence from this study, it is difficult to draw any final conclusions in this matter, however there is an indication that documenting it every day might have a positive effect. In the comparison between the average grade in the group of students, who documented their frame every day and the group of students, who did it occasionally, it is evident that the first group ended up with slightly better grades. In group 1 (diary) the average grade was 8,14 on the Danish seven-point grading scale (which is between B and C on the international ECTS scale – however closer to C) and in group 2 (who documented their framing occasionally) it was 6,85 on the Danish seven-point grading scale (which is just below C on the international ECTS scale). Even if the numbers reveals a difference of 1,29 grade-points, it is important to know that typically there is 3 grade-points between the grades in the middle of the Danish seven-point grading scale (B = 10; C=7; D=4).   Furthermore, when comparing the group of students, who documented their frame every day and the group of students, who did it occasionally, the span of grades in the two groups are similar. It ranges from the grade: 12 to the grade: 4 on the Danish seven-point grading scale (which is a range from A to D on the international ECTS scale).

Finally, the aim of this study was to explore if there is a qualitative difference between those student with a high grade and a low grade – in terms of how they handle and document their framing process during the project. Even if the number of students, who documented their framing process (daily or occasionally) is only 14 student all in all, it is possible to see a pattern in the way the students with low grades, handled and documented the framing process compared to those students with high grades.

First of all, the formulations of the frames are very different when you compare the students with low grades and the students with high grades. Even if almost all students start with a fairly overall formulation of the frame, the students with high grades relatively fast find a certain direction for the project framing and from this point on; they nuance the frame again and again. On the other hand, the students with low grades remain in the overall formulations.

The second difference between the students with high grades and low grades is the number of times the frame is revised. The students with low grades have a tendency not to revise the frame. There are several examples where they write 'same as yesterday' or even copy the sentences several days in a row. The students with high grades frequently revise their frames by adding nuances to it or by exploring different formations.

Thirdly, the documentation of the framing process also reveals a difference in the way the students with high grades and the student with low grades do research and document their findings. The research strategy for the students with low grades is characterized by an attempt to cover most 'territory' i.e. a student, who focused on working-environment, did research on both: different ways of thinking, basic needs, motivation, social needs and on concentration – in one loop. Parallel to this, the students with high grades seemed to research one or two topics at the time and then reflect on the outcome of this research in order to find new or more nuanced focus. The difference in the research

strategy was also revealed the way the students documented their findings. The students with low grades had a tendency to list all their findings one after another. The students with high grades often shortly documented their insights, and followed it up with a number of questions in respect to what they did not know. I.e. one student wrote in his reflection: *'What do people do when their desk gets cluttered? Where do they put their 'stuff' when they need to get organized?'*

The final difference, between students with high marks and students with low marks, was the way they reflected on the framing process. Here the students with high grades seems to reflect much more in the process and ask more critical questions. In general, the students with low grades, seemed to use the reflection space as a place to summarize, what they had been doing. The students with high grades on the other hand used it for critical questioning. i.e. one student with high grades wrote: *'Is there even a need for storage in the modern office?'* And another student wrote: *'Am I right about the framed problem?'* A summary of the findings is placed in figure 4

	Students with low-grade	Students with high-grade
Formulation of the frame	Overall	Specific, more nuanced over time
Revision of the frame	Few times	Frequently
Research strategy	Aiming at covering most 'territory'(zooming out)	Aiming at finding a focus (Zooming in)
Documentation (of move)	Document, what they know	Document, both what they know and what they do not know?
Reflections	Summary	Critical questions

Figure 4. Summary of the qualitative difference between the students with high and low mark

4 CONCLUSION AND DISCUSSION

The aim of this research project was explores the effect of encouraging students to make their project frames explicit during the development of a conceptual design. The assumption was that if students make their framing process explicit and document it regularly, it will encourage more attention to the framing process and thereby create better project frames and projects. In order to understand more about the framing process, this research also explored whether it made a difference to document the framing process everyday or only occasionally. And finally the study explored the qualitative difference between the 'project framing' of student with high and low grades.

In terms of the result, the study did show any remarkable difference in the grades between those students, who documented their framing process and those who did not. The students, who documented the framing process, did have a slightly better average grade, but the small difference could also have been caused by many other things i.e. by the fact that 14 students, who documented the framing process are compared with 29 students, who did not documented it.

The study also did not show any remarkable difference in the grades between those students, who made their framing process explicit everyday and those who only did it occasionally. The students, who documented the framing process everyday, did have a slight better average grade compared to those, who did it occasionally. However, since the number of students who volunteered in the study was only 14, such a slight difference could have been caused by many other reasons.

But even with the small number of students, who documented their frames, there was a noticeable difference in both the way and depth in which students with high grades and low grades developed their frames and engaged in the framing process. The students with low grades formulate the frame in 'overall' terms, revise it few times, aim their research at covering most territory, document what they know and summarized their findings. The students with high grades on the other hand formulate their frames as specific as possible, revise it frequently and nuance it over time; focus their research, document both what they know and do not know and reflect by asking a number of critical questions.

In general, the low number of participants in the study means that the results are to be seen as indications, which need further validation. Still, the study provides an interesting basis for further research in area of student framing as well as in the area of design education pedagogy. In the area of student framing there is potential of unfolding a similar study in a larger setting, where more students document their framing process either daily or occasionally. Besides this, there is the potential of going deeper into the qualitative difference in the framing process between the students with high grades and low grades for instance in the perspective of building competence or maturity within the design profession. This again points to building methodology for creating frames.

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