

Reframing Architecture; Reflection on Learning Outcomes

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Abstract

This paper aims at the discussion of opportunities and challenges of using *framing* as a tool for *sensemaking* in construction education in art and architecture schools. In this case, a frame is a collection of stereotypes that one relies on to understand a given concept (Goffman, 1974). By framing a question using a collection of specific sub-problems, the student is motivated to produce explicit knowledge by a reflective implicit process.

In this context, I present one workshop as preliminary test case. Over a period of eight form-study workshops, the student works on a form-study by incorporating specific sub-problems into a geometry. An action research strategy is used to structure the case study. By using reports, surveys and interviews, the process is monitored.

1. Introduction

Ever since the industrial revolution, building skill has become increasingly fragmented. With regard to designing in general and architecture in specific, hand and head are generally divided into a distinction of the design of the building and the actual production and assembly of its parts. The idea of making a design conception complete before it gets constructed is frequently the rule rather than the exception (Sennett, 2008).

With head-skills being separated from the hands, the engineering part and the actual designing part of the architectural process are regularly isolated in practice. In most extreme contemporary situations, the architect works out the form-making in the first stages of the process. Next, the contractor or developer makes the form buildable in the subsequent stages, prioritizing economic feasibility over form delicate conception.

Today, a great lot of schools works with a similar distinction. Where art and architecture students give primarily importance to form and conceptualization, engineering students isolate technique and construction from the designing process. In most cases the two disciplines don't interact during studio or design exercise.

In non-traditional and often advanced architectural practices, a different paradigm of thinking is active. The character of this collaboration between architecture and engineering is called "Structural Turn". The traditionally separate areas of concern work within a pure disciplinary manner. Within the Structural Turn, a multidisciplinary and often interdisciplinary approach is favored. In this integrated form of design practice, hybrid information is used to bring about new forms of collaboration and new modes of operation (Leach, 2004).

In this paper *framing* is used to expedite *sensemaking* in construction education to support interdisciplinary collaboration in art and architecture. I will start my study by describing the current and interdisciplinary modes of education (Section 2). Next, the use of Bloom's Taxonomy to monitor learning outcome is discussed (Section 3). Following I will describe one case study for testing *framing* as a tool for *sensemaking* (Section 4). Finally I'll evaluate the study and draw up conclusions and reflections (Section 5, 6).

2. Interdisciplinary Education

Departing from the disciplinary design situation, two modes of building education can be distinguished. The first mode is viewing building as a science. In this case, obtaining knowledge *explicitly* is emphasized. The second mode is viewing building and architecture as an art. By emphasizing on the development of skill and intuition, knowledge is obtained *implicitly* (Salama, 2007).

To be able to reinforce an interdisciplinary design understanding in education, an overlap in both fields of knowledge should be obtained. According to Cross (2011), the outline of both areas is delineated by types of design approach. In this dichotomy, the designer distinguishes itself from an engineer by trust in intuition. In the *implicit area*, design knowledge of the designer or architect is often tacit, founded on a reflective process. In the *explicit area*, the engineer is feeling unhappy using intuition in design decisions. Using explicit knowledge, the engineer wants to be able to test and measure design choices.

For architecture students to be able to work and think more interdisciplinary, design intuition should expand technically. With the student being trained in acquiring knowledge implicitly in practice, in this research *framing* is used to expedite *sensemaking* (Klein, 2006) in architectural making. In this context, framing is used to provide understanding within a "world" or "reality". By selective attention, experiences are organized, events are rendered and actions are guided (Goffman, 1974). By becoming more skilled in technical knowledge production, the architecture student is able to increase the development of knowledge, critical to successfully create a building. As a result, the student can advance from a passive technical end-user into a more active engineering knowledge producer.

For engineering students to be able to contribute to an interdisciplinary collaboration, design intuition should expand intuitively. With the student being trained in acquiring knowledge explicitly and applying skills by the book, *framing* is used to expose design alternatives. By becoming more skilled in reflective practice, the engineer student is able to increase the development of knowledge, critical to successfully design a building. As a result, the student can advance from a passive fixed-method end-user into a more active designerly knowledge producer.

3. Learning Outcome

To be able to monitor progression in workshop and studio exercise, the unrevised taxonomy of the cognitive domain by Benjamin Bloom is used. The taxonomy distinguishes seven stages; knowledge, comprehension, application, analysis, synthesis and evaluation. For workshop monitoring, four stages are discussed (Arens, 2008).

Prior to the workshop-period, the students are asked to answer closed-ended question in four stages of the cognitive domain first and one open-ended question second. The first set of questions ask the student to rate their current state of material knowledge and technological comprehensive ability. The second set of questions asks to scale the student's ability to evaluate their actions in application. The third and fourth set of questions asks the student to rate the amount of pleasure they have in presenting and expressing their ideas first, and the importance of form-study and prototyping in their current working place second.

The student is able to answer the closed-ended questions by a number-scale going from 2 to 10 in steps of 2. As a result, two numbers were less than five, three numbers were higher than five, which rules out a neutral standpoint. The lower side of the scale represented a negative value, the higher side of the scale the positive value.

At the end of the workshop-period, the students are asked to fill out the form for a second time. The student was not informed about this procedure beforehand. As a result, none of the students remembered or wrote down their first estimations. Herewith, the second survey was not influenced by earlier assumptions.

4. Case Study

To test and evaluate the quality of *framing* as a tool for *sensemaking*, an action research strategy is used to structure the case study. In the study I want to find out if a framed exercise workshop set-up improves understanding of architectural making. For the exercise, a taxonomy for architectural making (Vrouwe, 2012) is used as a framework. The taxonomy is divided into seven supertypes; Materials, Products, Processing, Connection, Finishing, Orientation and Structure Systems.

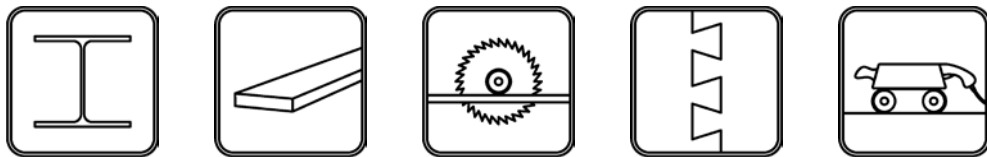


Figure 1
Form-Study Workshop Exercise Sub-Problems.

The student is presented a combination of four to five sub-problems from the taxonomy, together with a basic geometry like a cube, pyramid or sphere. Within a given period the student has to incorporate all sub-problems into a form-study, inspired or limited by the basic geometry.

The case study discussed is a form-study studio-exercise, performed at Amsterdam Academy of Architecture. Similar exercises are conducted over a period of half a semester, four times in a row. Each period consists of an eight week period. Every week the student works on a different sub-problem combination within a three hour time period.

In the form-study classes discussed, two to three groups of twelve students work simultaneously. In this set-up, the researcher collaborates with the teachers Arjan Karssen, Michiel Kluiters and Koosjan van der Velden. All teachers are practicing and building-active artist, designer and architect.

For the case study's data collection, three source of evidence are used. The first is the subjective score of the student inquiry. By comparing the scores from before to the scores after the workshop, a learning curve can be calculated. Secondly, the results from all workshops are archived. For each form-study exercise, the student makes a small one-page report by answering two questions accompanied by a photo or sketch of the result. The form-study archive describes a summary of the student learning curve, and makes subsequent workshops comparable. Finally, apart from the participating form-study teacher, the outcome is reviewed by the collaborating teachers. This way, a subjective work review is proceeded by the participating teacher accompanied by an independent objective review of the external teacher (Luyten, 2012).

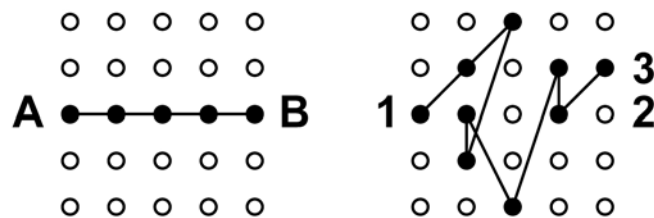


Figure 2
A to B: Conventional Engineeringly Approach, A to C: Reflective Designerly Approach

The 12 person groups consist of students with different nationalities. All students have a building technology, physics or comparable scientific background. With Bloom's taxonomy as reference, the student's former education starts with knowledge as a starting point (A) and works the way up to application and analysis (B) in a well-structured manner. Using standards and codes, the student is used to systemized, rectilinear methods (Arens, 2008).

In this study, the aim is to expand the student's explicit knowledge application to a more implicit, intuitive knowledge production. By starting with a set of, often uncomfortable, sub-problems (1), the student is motivated to acquire knowledge by doing. By a trial-and-error method, the student learns by *assimilation* and *accommodation*. By assimilation, new knowledge is incorporated into the existing knowledge, by accommodation conflicting knowledge is reworked into a more sufficient alternative and incorporated into the design (3) (Salama, 2007).



Figure 3
Form-Study Workshop Exercise, Sub-Problems: Pyramid inspired shape by using foam formwork and plaster.

To be able to accommodate a wide material and form intuition, a broad scope of materials and techniques is covered in exercises. Starting with small-scale studies, in wood, plaster, cardboard etc., the student finishes with world-scale architecture prototypes.



Figure 4
Form-Study Workshop Exercise, Sub-Problems: Donut inspired shape by inflatable foil construction.

5. Evaluation of the Study.

At the end of the form-study period, each student is interviewed. During the interview we reflected on the inquiry from before and after the workshop, the workshop reports and the workshop models.

The student was notably curious to know the outcome of the inquiry. The initial values varied per student. Eastern-European, Southern-European and African students scored themselves lower on questions concerning material and technical knowledge and comprehension and scored themselves higher in presentation and application. Reasons for these scores were based on a rich drawing and sketch tradition on the one side and a small tradition of construction in mere cardboard on the other side.

With questions concerning knowledge and comprehension, Dutch and German students scored themselves two points higher on average. On evaluation and application, the students' scores were comparable with their foreign schooled fellow students. The scores on the amount of use of prototyping and form-study in practice depends greatly on the bureau or office they work.

On average, the scores were increased by three points over the period. Students mentioned that form-study and prototyping became a greater part of their designing process. During discussion of the reports, two important things were noticed. First, on average, the student showed the intended change in design approach after four weeks. In the beginning, the framed sub-problems were seen as an unpleasant given. The students were struggling to incorporate the sub-problems into the design within the given time-frame. Often, much time was lost in structuring the process in bite-size parts and assembling them into a form. After the four weeks the students were able to give themselves space to explore and fail to succeed in the end. Starting with the possibilities of the given material and techniques they learned by doing. Second, the student appreciated the weekly reports. Because the methods they used were relatively new, they were not able to *reflect-in-action* (Schön, 1983). As a result of a steep learning curve, they focused on the process closely. The students were not able to see the bigger picture. The reports helped them to *reflect-on-action* (Schön, 1983). During

the interview the student was very able to describe the learning process over the eight week period.

6. Conclusions

By using *framing* as a tool for *sensemaking* in architectural workshop education, I was able to expand the student's explicit knowledge by using an implicit reflective process. By challenging the student with a specific set of sub-problems to be applied into a form-study of a basic geometry, I was able to make explicit knowledge more salient implicitly.

To test *sensemaking* by *framing*, an action research strategy was used in a workshop set-up. Data was collected using three sources of evidence. Comparing the data from before the workshop to the data collected at the end of the workshop showed a significant growth in knowledge of architectural making.

In future studies, I suggest to perform specific framed workshop exercises in a parallel manner. Apart from the pre and post-observation, in this set-up similar framed exercises of different components can be studied in a comparative manner.

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