

Design Thinking and Aesthetic Meaning-Making: Interlaced Means to Engage in Collaborative Knowledge-Building

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Abstract

Engaging in knowledge building that is collaborative and that integrates design thinking among interdisciplinary teams is increasingly a means to innovate in product and service design and in business. However, the actual ways this might be accomplished are challenging. These questions are important ones for design educators, researchers and practitioners. This paper studies the question from an educational point of view. It examines what happens when two design researchers and educators, one from an industrial design background and the other a design process oriented background, animate a workshop and how the participants roleplaying various stakeholders engage in design thinking, both as a discovery strategy and through the concept of ‘aesthetic meaning-making’. The workshop aims were to improve collaborative design thinking skills and to explore how a team of experts and non-experts interact within a design project to achieve consensus on goals. During the workshop participants became at once users and makers of emergent results. Two of the participants add their perspectives on how, in this scenario-based workshop project, the exchange of knowledge and learning occurred through both their phenomenological experiences and the collaborative inquiry. They also explain how collaboration among their respective teams resulted in their innovative propositions. Design thinking, complex project scenarios, and collaborative inquiry within interdisciplinary teams, in the context of design education, form the framework of this paper. The process is described, both in terms of the theoretical framework that underlies the concepts of meaning-making with users and as a form of engaging in experiential knowledge generation. The theoretical framework and workshop description introduce these concepts and the workshop engagement and results are presented, with perspectives from the workshop creators, the animator and the participants themselves.

Keywords: *Collaborative design, design thinking, interdisciplinary teams.*

Introduction

Design projects are ill-defined and complex [28, 29]. In today's projects an increasing number of disciplines and users need to get involved, share their information and build knowledge based on many perspectives [15, 26]. Thus design activity is considered also a social process [4] where ideas emerge from different people. However Kvan suggests that “design collaboration requires a higher sense of working together in order to achieve a holistic creative result. It is a far more demanding activity than simply completing a project as a

team” [17]. This paper traces the process of engaging collaborative knowledge-building through both the conception of a workshop and the work done during the workshop to generate consensus. Our objective is to propose a process that engages a team in collaborative design and can be used in educational situations, where students need to learn and experience sharing, prioritizing, understanding others perspectives, achieving consensus and construct new knowledge collaboratively. Active role participation, design thinking, and consensus-building are used as tools of making meaning and for problem-solving with business goals and ends. The workshop, entitled “Defining goals through collaboration using design thinking: Building consensus among designer-user-client-stakeholders” was aimed at bringing together diverse students and design researchers to engage in consensus building by using aspects of design thinking for problem-setting and defining goals for a scenario-based project. The workshop was a hands-on means to explore design as a ‘meaning-making’ [22, 23] process and as a real ‘in situ’ experience [12]. The engagement and collaboration of clients, users, designers and other stakeholders was at heart of this novel practice, in that the participants roleplaying various stakeholders worked together to both formulate the problem and consider the possibilities using design thinking as a strategic tool. Sets of tools were designed and used for pedagogical activities and in order to record information. The workshop, which had a research and an educational purpose aimed to improve collaborative design thinking skills and explored how a team of experts and non-experts interact within a design project and achieve consensus on goals.

The example of collaborative inquiry through the experience of the workshop is presented, with an introduction to the theoretical framework underlying the goals of the workshop. Two of the workshop participants (representatives of two teams) were invited to comment on the ways that the workshop achieved its purpose, and what new knowledge was gleaned. The perspectives of these team representatives are explored and the analysis extrapolates how common understanding is reached on the value collaboration and meaning-making have when done in a workshop setting.

Theoretical Framework

The overarching theoretical framework considers the collaborative inquiry within interdisciplinary teams, design thinking in complex project situations, and the concept of meaning-making, with a focus on the context of design education.

1. Collaborative inquiry

While the workshop is a premise for engaging different researchers in understanding hands-on/in-situ experiences, underlying goals of the workshop were multifaceted. The gleaning of knowledge in a tacit experience-based workshop engages researchers in a new means to understand how design activities are used to move knowledge from one type of understanding to another. In this form of inquiry, known as co-operative inquiry, Heron and Reason [11] suggest that the people doing research become active agents in the research process, and that both practical issues are addressed alongside research concerns. According to Heron and Reason, the practice of co-operative inquiry includes three steps. First, collaborators seek to make sense of the world around them, and the situation at hand. Second, through their interaction, new and creative ways are developed to look at things. Finally, collaborators take action and work together to consider how the subject of the collaboration can be improved.

This echoes theoretical ideas about collaborative inquiry and concepts of ‘knowledge spaces’ such as the ideas perpetuated by Ash Amin and Patrick Cohendet [1] in their book ‘Architectures of knowledge: firms, capabilities and communities’. Amin and Cohendet speak

about the capacity of communities to build knowledge through dialogue and by engaging in the concept of ‘learning by doing’ (p. 94) where they introduce the idea of ‘ba’ as defined by Nonaka and Konno in Amin and Cohendet, [1], when they state:

“[...] Nonaka and Konno (1998) have suggested that the Japanese philosophical concept *ba* (roughly, *place* in English) helps to highlight the ‘shared space for emerging relationships’ in the ‘foundation of knowledge creation’. [...] original, face-to-face experiences are the key to the conversion of tacit knowledge [...] exercising *ba* ‘facilitates the conversion of explicit knowledge to tacit knowledge’ and is ‘enhanced by the user of formal (explicit) in real life or simulated applications’ (1998, p. 46-47)”.

Although the concepts are clearly far more complex as Amin and Cohendet suggest, for the purposes of this paper, these ideas are of interest to ground the relationship between design thinking, collaborative inquiry, and making meaning through an engagement of visual and verbal dialogue. This means that dialogue, when used in a simulated scenario-based project, uses the tools of ‘design thinking’ as the catalyst for the experiences that bring together people to engage in the ‘shared space for emerging relationships’ (*ba*) and that through the dialogue and ‘shared space, meaning-making is stimulated and provoked.

Another aspect of this type of work is the idea that practical ways of collaborating require a practical approach and are more pragmatic in nature. This type of collaborative inquiry, as it was explored in the workshop, engages people in constructing new meanings and situating these meanings in practical issues of the design project/situation. There is a particular iteration that occurs between the collaboration, the interplay of reflection and the experience itself [11, 23]. For example, Heron and Reason [11] speak to the problem of traditional research as too theoretical and not concerned with practical issues, when they state:

“We believe that good research is research conducted *with* rather than on people. [...] We believe that the outcome of good research is not just books and academic papers, but also the creative action of people to address matters that are important to them. Of course, it is concerned too with our understanding of our world, as well as transforming practice within it (p. 179)”.

In co-operative and collaborative inquiry, Heron and Reason organize this approach around the active engagement of the participants, an intentional ‘interplay between reflection and making sense on the one hand, and experience on the other’ [11, p. 79], and that multiple inquiry cycles frame the iterative knowledge-building process. The process of coming together to engage in consensus building and using design thinking engages participants in this type of inquiry.

2. Design thinking and the pragmatic and complex nature of design projects

When design thinking is considered as an innovative practice, it is also considered to add value to projects. But the nature of design thinking is not always clear. Using design thinking means understanding the fundamentals of design approaches [21]. In their seminal book, *The Design Way*, Nelson & Stolterman [21] define design approach as situated in the fundamental skills of design thinking, which include: “desiderata, interpretation and measurement, imagination and communication, judgment, composition and production, and care taking” (p. 132). The authors add that design approaches includes determining needs and assessing desires, to be intentional in gleaning ‘desiderata’, conditions and contexts, to be able to then provide ideas and innovative solutions. In situated contexts, this means understanding the desired outcomes required, how these will be examined with collaborators, and then how to begin generating possibilities for possible solutions. Complex design projects need to be understood from multiple perspectives and require situating them within real contexts, such as

the experience of the environment within which the product will be used or the design experience. This dynamic cannot be situated as apart from the more intimate aspects of human experience, including senses and affective responses [23, 24]. Today bringing a team together, for solving various parts of the problems, in a virtual or face-to-face setting is a common practice. However participants often have difficulties with understanding each other fully and sharing knowledge. They each have their own knowledge, operating procedures, and ways in which they communicate about the design and make representations of their ideas [14, 15, 25 and 31]. For example, in a Human Computer Interaction (HCI) project, it is crucial to realize the nature of collaboration, in the context where the goal is user-centeredness [25, 32] and where problems are complex and wicked [7, 8 and 19].

3. Design thinking, design process and meaning-making

When design practitioners work with and for others, they often deal with conflicting positions of various stakeholders involved in the design process. They frequently run into difficult situations regarding the sharing of knowledge between stakeholders who do not have a common language of communication or a similar understanding of the needs and motivations of the user [30]. However, in the design process, communicating is a fundamental way of understanding the needs of the people who will be the recipients of the design, and the real time experiences of dialogue that occur transform the design into the reality that functions in the context for which it was conceived. This *reality* is the situated experiences of the participants [24]. Here, communication refers to the meaning-making [23, 24, 25] that occurs when people actively engage in discussing design problems and issues, linking design systematically through the integration of functional issues with aesthetic concepts, and making decisions that then are implemented. Whether verbal or visual languages are used, conversation and dialogue clarify meanings, identify contexts and reveal values important to diverse actors in the design process.

If we consider ‘designing’ to be a process or a system [20], then we make meaning through the ways that we use design to move forward ideas from vague concepts to feasible realities. Nelson & Stolterman [21] define meaning-making in the context of systems thinking, as they suggest:

“Meaning-making is essentially the creation of relationships of understanding, specifically between that which is experienced and the one who experiences. These relationships form a belief system, inclusive of the real, true and ideal, that informs actions, reflection and imagination in specific situations (p. 80)”.

This belief system is essential to design thinking. Design thinking refers to Bruce Archer’s concept (Archer, 1979, cited by Cross [6]) that:

“...there exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry when applied to its own kinds of problems”.

Design thinking cannot be separated from the ‘designerly ways of knowing’ [5]. Design thinking ideas also bring to mind Donald Schön [29]. In ‘The Reflective Practitioner’ Schön promotes the knowledge and process that designers and other practitioners bring to situations of uncertainty, instability, uniqueness, and value conflict. Design is a reflective practice and design thinking leads to formulating problems. Schön [29] suggests that to formulate a design problem to be solved, the designer must frame a problematic design situation first. S/he must set the boundaries, select particular and important things and relations, and impose on the situation a coherence that guides subsequent moves.

From practitioners' viewpoints Tim Brown [3] at IDEO, explains: "Design thinking begins with skills designers have learned over many decades in their quest to match human needs with available technical resources within the practical constraints of business" (p. 4). It puts these tools into the hands of people who may never have thought of themselves as designers and applies them to a vastly greater range of problems [3]. Lombardi [19] shares also these views. He defines design thinking as collaborative, abductive, experimental, personal, integrative and interpretive. Also, design thinking is considered to be a catalyst for business thinking [2, 24].

Design thinking thus becomes a collaboration strategy involving many people in the design process to learn collectively from each other, make meaning of the situation in hand, and deal with complex and ill-defined problems. It promotes the team to tell stories, to make sketches, to test early in the process through mock-ups, and to observe user experiences and interactions. When design thinking is coupled with collaborative designing, then both user experiences and design abilities drive strategies to deliver innovative solutions in the contexts intended.

Questions and methodology

As the purpose of the workshop is to glean new understanding and collaborative knowledge-building in an experimental manner, this research naturally falls into the framework of Participatory Action Research (PAR) [14]. Collective action [10] and meaning-making [16] frame the philosophical underpinnings of this research, and the workshop is the practical application of the development of participants' reflective practices through the workshop activity, both as a means of co-developing design thinking but also in framing it in a collaborative process. Reflection on this project falls also into the framework of Research through Design (RtD) [9, 33]. RtD is increasingly used in the context of HCI projects [32, 33]. Various tools were used to collect and record both the workshop process itself as well as the activities of the participants.

To enrich the process of engaging a team in collaborative design, we focused on the following set of questions in the context of the workshop:

- 1) How do participants work collectively? Collaboratively? How do they make meaning?
- 2) What is the value of the workshop from the perspective of the i) participants; ii) the facilitator;
- 3) What methods might be gleaned as useful for this type of collaboration and for future workshops?

These questions serve as the guideline for the engagement of the theoretical framework described, with the practice of the scenario-based workshop.

The research methodology also includes the following steps:

- a) Setting goals for the workshop and a framework by creating an '*a priori*' setting – the workshop and a scenario;
- b) The workshop as a PAR project, where the researcher/facilitator participates actively with the participants to glean an understanding of the activity;
- c) *A posteriori* reflecting on the exercise done by the two teams' representatives (A and B) who describe the events and their perspectives of the workshop experience as this occurred.

The Workshop Description

The workshop session was presented by the design researcher/facilitator. A group of 14 participants attended this four-hour workshop. Participants were from various backgrounds: design practitioners, design educators, master and doctorate students in design fields, a post-doctoral researcher, and a researcher from a school of business and economy. Participants were from the conference city as well as from all over the world, such as Europe, Asia, and Canada.

The workshop, which focused on design of a HCI project, was structured in several parts, beginning with a kick-off question and a short presentation by the researcher/facilitator. That was followed by specific activities where the participants could interact around the project, exploring stakeholders' dynamics in design thinking. The last part consisted of presentations by the participants and a final discussion.

After the presentation by the researcher/facilitator, the participants formed two teams of seven (team A and team B). Once diversified designer-stakeholder roles were assigned to each participant (i.e. programmer, marketing agent, project manager, designer, content expert, user 1, user 2) they each developed a persona to reflect some of the characteristics that may be typical of such stakeholders. Each team was split again to form two smaller sub-teams (of three and four persons). Using design thinking as a premise, each of the sub-team participants were guided by the facilitator and used a form that was designed for the purpose of this activity in order to reflect, in his/her role, on the goals of the HCI project and its priority interactions. The form, called Q.A.S (Question, Answer, Score) included the main question of the project and provided a particular structure to collect answers and scores given by the others. It assisted sub-teams to share views and objectives, to generate new ideas and discuss to clarify each role's important issues and concerns. Sub-team members created a common understanding of the goal and priorities of the project. Then, the sub-teams merged to recreate the A and B teams, shared and discussed their goals, and achieved consensus. Based on their common understanding, the two teams worked collaboratively on the design, made mock-ups and tested them with their personas and scenarios. Finally, each team presented its vision of the project and its concepts. That was followed by a conversation among all participants. The designer's role in articulating the complexity of HCI projects and creating a common language between clients, users, designers, and other stakeholders was then discussed as a means to complete the workshop.

The researcher/facilitator recorded the experiences and observations about the scenario-based project as it unfolded, while simultaneously participating and animating the workshop. At the end of the workshop, the researcher/facilitator gathered feedback from the perspectives of the participants themselves.

Post workshop discussion of experiences

Participants were offered an anonymous questioner for feedback. Questions aimed at finding out the educational value of the used approach, its efficiency regarding consensus building and its capacity to help the team to generate new ideas.

The participants' feedback was positive and constructive. The three most highlighted characteristics were the pedagogical aspect of the workshop, the tools that supported collaboration, and the achievement of consensus on goals in a very short period of time. As an example, one participant noted: "The collaboration exercise was very interesting, especially looking at design aspects from different/unfamiliar angles. The collaboration has been

successful, but we did not reach the level of proposing guidelines or ideas in our time frame. The main value was in the discussion itself ...”.

1. Two participant reflections

We invited two of the participants who presented the work of their respective teams, A and B, to describe their views of the experiences of knowledge-building through design thinking. Below are excerpts of their reflections:

Participant reflection of team A

“Step 1: Once the stakeholder roles were assigned to each participant and a persona was developed [...] participants were asked to come up with the most appropriate answers to the question “What is the purpose of the site?” based specifically on the needs and desires of the personas that were created. The purpose was [...] to use the personas as a guide for thinking about the answers to the question. Each member of each sub-team wrote down their top three answers on a given sheet and passed it along to the next person in the team. That person then rated the importance of the answers on a 5-point scale, based again on their particular persona and role, and then wrote down another three answers. This process continued for another round so that everyone in the team produced a total of nine answers. The sheets were passed around again until each member rated each answer (except for their own) once. The scores were summed for each answer providing a total score for comparison.

This first step seemed like a great way for each stakeholder to express their thoughts about what the purpose of the website should be and to share that information with the other stakeholders within the team before debating anything about the answers. It provided an opportunity to be very open and honest without being directly criticized upfront. This seems like an important aspect at the beginning of a collaboration, especially if the members do not know each other or have never worked together before.

Step 2: In the second step of the workshop, a discussion was held within the sub-teams to review the answers to the question and amalgamate any similar or redundant answers into one. Each answer was then reworded and written on a post-it note along with their respective total scores. The notes were organized by their score values, clustering the high-scores together, the average-scores together, and the low-scores together.

This step allowed the stakeholders to talk about the answers that were generated and to refine them into more coherent, short statements that were then the basis for further collaboration. The participants were able to share their diverse knowledge to inform the others as to the importance and relevance of their answers which provided the opportunity for each stakeholder to learn about the different user needs. It seemed that this first collaborative interaction was important for building a common understanding of the user and stakeholder perspectives.

Step 3: The third step was then to gather back as a whole team and combine all of the answers together. There was a heavy discussion revolving around the value and relevance of each answer [...]. At this point, a second question was introduced to the team asking: “What should be the website’s characteristics?” The team worked together to [...] generate certain characteristics that would support the needs of the users as established through the earlier steps, all the while still acting in the assigned stakeholder roles.

This process was evidently important in building a consensus amongst the team as to what the purpose of the site should be and what might be the characteristics that would drive an innovative solution. Knowledge sharing and communication became essential factors in this collaborative action. It was inevitable at this stage of the project for conflict to arise and the diversity of perspectives within the team made it difficult to come to a consensus. This is where the challenges of communication and interdisciplinarity became clear. However, despite such challenges, everyone was committed to the project and attempted to use the conflict in a positive way by listening to and learning from the other stakeholders within the team. By learning from the others, team members may be able to make better, more informed

judgments which will ultimately lead to more creative and thoughtful input. There also seemed to be some elements of compromise during the process which may be quite important when dealing with project time constraints. [...]"

Participant reflection of team B

Step 1: I was assigned the role of the website designer which is close to what I actually do a couple of times a year in real life. From 2007 on I have been designing websites, corporate identities, and book covers for various clients. As for conferences, this was actually my first real conference experience. So, as a stakeholder taking part in this workshop, I was not very far from my actual daily life and I had more web design than conference experience.

This step of the workshop was defined as both individual and team activity. The individual part was filling in the forms while the team part was passing them on and ranking [...]. I had an empty template in my hand. This gave me the feeling that I can fully concentrate on what I believe the purpose of the conference website is without any bias, distraction, or criticism by other stakeholders and write my point of view down. [...]. From the second round on the process was a bit different. [...] I experienced a gradual learning process. This way I could learn the following: (a) I could learn the previous stakeholder's opinion about the purpose of the website, later also that of other stakeholders. This informed me about what the previous stakeholder values most about the conference website. It was also inspired with different perspectives and dimensions to extend and elaborate my opinion on the purpose of the conference website for the every next round and to question my earlier recordings as well. (b) I could also see how different stakeholder ranked my and other's input. This helped me to learn a bit how each stakeholder perceives my input and enabled me to indirectly indicate my opinion on how I perceive their input. (c) As the forms were passed on and on, more information about the other stakeholders was revealed to me. But even more important, due to the setup and revelation of the total scores, I felt that our opinions about the purpose of the website started to merge together towards a set of opinions that we all more or less shared.

What I believe is very valuable in this way of working is that: (a) people can share their value and opinion about the purpose of the project, i.e. the workshop subject, without the bias of limitations (not being able to) or cons (e.g. being over dominant) of their character or interpersonal skills to get in their way. (b) One learns about and gets to know the other stakeholders more on their added value (with the emphasis on construction) for the project rather than their personality/character. (c) Commonalities and differences about the purpose of the project become evident in a peaceful and almost natural way. [...] Moreover, the form [Q.A.R form described earlier] worked well as a boundary object to bring all stakeholder input on the same level for collaboration.

Step 2: At this point I was able to better express myself [...]. I noticed that different stakeholders, due to their role (background) used different terminology to express proposes of the conference website. [...] I felt I could understand them better after we put different formulations next to each other and came up with a new terminology upon which we all agreed and could make sense of. [...] In general my perception of the activity in this step was that it went quite fluent and much easier than I thought it would go. [...] Consensus was reached unexpectedly quite easy [...].

Step 3: At the start of this step our small group gathered with the other group and we formed a team [...]. Working with more stakeholders brought the work to a higher level. What was sticking was that although did the previous 2 steps in separate small groups, we easily could become a team and further develop the content. I think it was a good idea to work in smaller groups first before coming together as a team because I think at the start of the workshop the barrier was still to high.

Consensus building – With this activity of the workshop I experienced a jump from a structured logical dialogue to a more intuitive emotional dialogue. Team members jumped from one topic to another. I perceived this as quite chaotic but as a designer knew that everything would come to a good end. What I liked was that the team members still stayed

close to their stakeholder roles somehow and leveraged this for the discussion. There was a lot of storytelling going [...]. We used this step of the workshop to reframe the design challenge. We went beyond the brief which was about designing a conference website and focused on experiences and tried to understand what the underlying values of stakeholders and end-users are for having need for something like a website”.

Comments and discussion

Referring to the three main questions mentioned earlier (see “Questions and methodology”), the way participants interacted, discussed and gave feedback, and referring as well to the two narrative examples, we could say that this type of method has potential for design education. More specifically the benefits of such workshop could include:

- a) The participants are exposed to the diversity of perspectives of stakeholders;
- b) They understand the effect of sharing knowledge;
- c) They make the effort to understand the relevance of others’ ideas;
- d) They openly express their arguments; and
- e) They learn acting roles and approach situations with empathy.

In such workshops participants experience design activity as a social process and learn to collaborate rather than cooperate. The distinction explained by Kvan [17, in reference to Mattessich and Monsey] is clarifying:

“*Cooperation* is characterized by informal relationships that exist without a commonly defined mission, structure or effort. Information is shared as needed and authority is retained by each organization [...] *Collaboration* connotes a more durable and pervasive relationship. Collaborations being ... full commitment to a common mission.”

The workshop experience showed that, at certain points, the collaborative work introduced both conflict and compromise and despite these seemingly conflicting components, the team was able to build consensus and move forward. Through guidance by design thinking, the teams were able to make meaning of issues, desiderata, and of each other’s ideas through the collaboration.

The experiences of the workshop and the narratives of the participants make explicit the role of the dynamics in the process in making meaning and how design thinking approaches contribute greatly to the project. People come together with a purpose and engage in somewhat open-ended dialogue and collaboration to build tacit knowledge that becomes explicit in the process of understanding the situation of the scenario. *ba* is thus achieved through the interaction and the process itself supported by design thinking in the consensus building exercise.

In future workshops, possible adjustments include activities with longer time frames and developing the project goals further. This will allow us to study the interdisciplinary collaboration through a longer process, with more phases and by applying different tools and strategies. Finally, this workshop was a pre-test of ways of working, not a formal research project. The workshop was a way to work through some theories and ideas about design thinking, collaborative meaning-making, and aesthetic meaning-making. It has provided us with some key insights that will inform future initiatives in this research endeavour.

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