Gambiarra Meets Design Thinking: Scaffolding Embodied Creativity in a Design Lab

ABSTRACT
In this paper we report an exploratory study of developing a workspace of creative exploration as part of a design process inspired on a Brazilian improvisational street-culture, denominated Gambiarra. In a six month iterative design ethnography we adapted elements of Gambiarra into a formal, carefully designed 'Design Lab' for engineering and interactive computing students. The interventions produced alternative approaches to concept design and idea generation, whereby physical materials and their affordances recruited bottom-up improvisations and reflection-on-action. We propose this strategy as positively extending the basic model of design thinking, including materiality as a crucial element in the early phases of creative design. We evaluated how traditionally educated engineering and computing students can be seduced into utilizing their latent embodied creativity via a suitable, inviting physical space. One of the main insights for designing our Gambiarra scaffolds was combining material invitations and improvise with ways to store and display intermediate results in one integrated workspace, such that each person's 'material trace' of creative thinking' would scaffold those of others.

Author Keywords
Thinking through prototyping, scrap, Gambiarra.

INTRODUCTION

The DesignLab has the aim to bring science and society together through design by connecting education, entrepreneurship and research. The space is physically divided as a metaphor to the design process (ideation,conceptualize, prototype and exhibit) and works as a community of practice, where users learn by making in a communicative approach. There are two physical workshops, mostly used in a later stage of the projects and the access requires some making experience and a previous structured plan.

As a approach, Designing in Skills (DiS) [1] encouraged designers on making their everyday practice through body skill-based experience; "Making is a way to interact with the world that is meaningful to people: it requires our intuition and perception to be activated, our consciousness to be developed, our cognition to elaborate and

respond to our need for transformation." [1]. Gambiarra[3] is a type of bricolage in the brazilian context to the act of making an improvised object with disposable materials in a spontaneous process to attend a particular need. Gambiarra is a situated practice in which the solution emerges from instantaneous and improvised process (figure 1) using mainly discarded objects for another specific situation than their original ones through the following elements [3]:

- Vicissitude and adversity: Existence of undesired changes and instabilities of the environment or artifact;
- Improvised solution: emerges without a previous plan or preparation;
- Situated problem and solution: Designed for the specific context – spontaneous and idiosyncratic;
- Product precedes the creation: Alternative intervention on a product/material available that already had another use/meaning;
- Instantaneous material resources: It is a solution that appropriates from what is 'at-hand', in special, garbage, giving to the object a new meaning.
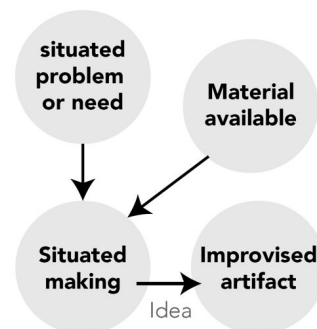

Figure 1. Gambiarra process diagram

METHOD DESCRIPTION

A 6 month ethnographic design research as a participant observer the space was analyzed and gradually converted into design requirements for a permanent space for those users. As a project, it was divided in four phases: main requirements, participatory activities, prototyping and final product. The reflections from the each phase where guidelines for the final product to stimulate creativity by thinking through prototyping.

In this ideation process, people got more inclined to assume risks and it also helped non-skilled participants to engage in the creative process by interacting and communicating through easy and instantaneous materials to be manipulated [6] (figure 2).

Figure 2. Example of models made in the scrap space

A tools organizer was developed to solve the problem of tools getting lost in the chaotic set-up and brought reflections of how a proper workspace station should keep the balance between a highly informal space to attract in a engaged and empowered way and at the same time maintaining the resources visible and at-hand. The first workspace concept was also developed through prototyping while ideating (figure 4) inspired by Street Stands (figure 3): flexible solutions enabling improvisation to be constantly adapted on how to display the stuff.

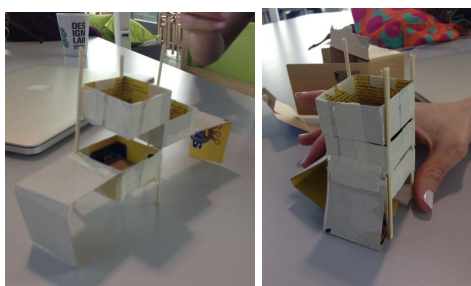**Figure 3. Example of ambulant and fixed street stands**

Figure 4. The problems on closing/opening the shelves as well as whether they should share structures or not were defined through a scrap model and acted as formal opportunities rather than obstacles to a concept

With the aim to create physical solutions for the space, an activity was held in which the participants were given requirements for the scrap space in which they were free to combine, repurpose, ignore or to add new ones. The solutions are hereby grouped and summarized in:

- **Working station solutions:** customizable tool settings, written/drawing functions, a backdrop to photograph;
- **Exhibit** prototypes to reuse and/or inspire
- **Communication** for users over the workstation use, such as tools purposes, material suggestions, feedbacks, etc.
- **Storing solutions** for scrap surfaces, small, patternable and hanging objects, Tools categorization.

DISCUSSION

The open access and 'at-hand' [6] scrap's availability was an alternative to fill a gap between ideation and prototyping: a TTP space with cheap and underestimated materials was a light solution as a provider of easy materials to manipulate with hand tools (figure 5).

Figure 5. Plate for keeping small pieces separated (bottom), a hanger (left) and how to store surfaced materials (right): those were ideas developed in a fast process and able to communicate the solution it has been addressed

The users are challenged to adapt to arbitrary constraints given by the scrap: the ready made shapes stimulated unexpected new affordances [7] during the interactions, held by the symbolic impurities of the discarded artifacts.

The informal configuration of the space emerged into a dynamic and collective attitude towards it: users modified it without being required to. Older models and/or leftovers were placed on the table

so others could eventually reuse it for another purpose, transforming the materiality in a spontaneous way.

The "generations of prototypes" were historical traces, an unpredicted potentiality for the table, maintained and shaped by the users. Those informal aspects can be inferred through the "messy" and approachable set-up: there was no one ruling or a formal way of use in contrast to the regular workshops at DesignLab, already integrated in the user's making and learning processes.

Some aspects of this particular marginal practice enriched processes of the current prototyping setting, that consists on technological equipments, software and complex procedures that require some level of skills and a previous plan rather than experimentation, making it less accessible during early phases of a project. From this contrast, some gaps of embodied sensemaking from the Design Lab's facilities were explored in the Gambiarra workspace. Physical models require a more detailed solutions for technical issues (e.g. how to assemble pieces, folding, geometry, structure, etc.) and conceptualizing exclusively on an abstract mindset might lead those aspects to be neglected and underestimated in the beginning of a project, which may turn them into obstacles in later phases. By ideating through prototyping, the awareness of technical issues (figure 6) emerged since the beginning and contributed to the process by bringing creative and unexpected solutions as design opportunities rather than only obstacles to overcome (figures 6 and 7).

Figure 6. Different ways to store the scrap material by hanging

Figure 7. Solutions for the Tools: they should be places on frames that can be temporarily taken out from the table

Formal solutions and concepts are better explained among people through physical models, which becomes a concrete "space of negotiation" between physicality and design decisions. To create through physicality and how we interact and manipulate the resources in the environment lead to results less based on expectations but rather, on concrete experiments and problems/solutions visibility (figure 8). Adding new meanings to ready-made processes enable new paths through the constraints created which are results of the free exploration that a software would not provide easily (Figure 8). Using the random materials from scrap one is forced to think in a non abstract but limited paradigm that leads to non conventional solutions and different ways of solving problems: unusual constraints are the motor for inventive solutions and new ideas in an intuitive process.
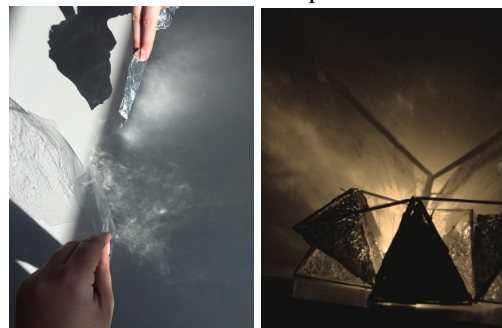

Figure 8. Experiments in a group with skilled and unskilled participants using cling film and aluminium foil (left) were embodied experiences that guided for a conceptual prototype (right) with lighting and material reflections for a luminaire

CONCLUSION

The experiment is now a permanent space from DesignLab maintained by the Dream Team. For further development it is suggested to build a proper workstation to stimulate and facilitate the contributions and insights for the process discussed above.

The models generated in the last ethnographic activity provided concrete ideas to solve specific requirements for the workstation. Figure 9 shows a possible structure to enhance the open-script design[9] needed for the project. The workstation can be divided in three parts: Exhibit, work and store.
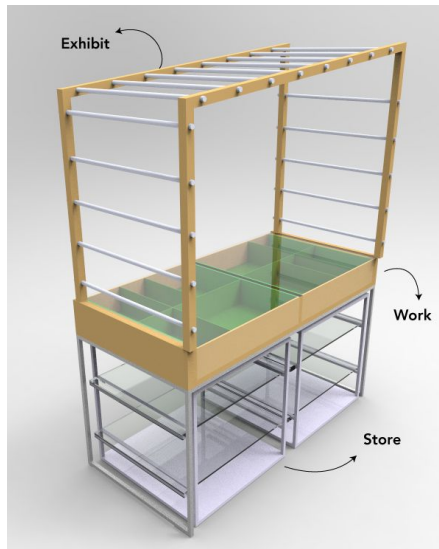
Figure 9. Open-script design workstation: the structure must allow the user to modify it

The exhibit consists on the bars which objects, tools and new gadgets built will be hanged and exposed through hooks and ropes including a "tools frame".

Work is the workspace surface with transparency in a way that the most used materials (like sticks, surfaces, small volumes can be always visible and be an inspiration below the furniture.

The third part, the storage is composed by wheeled carts that can be easily transported for activities such as workshops and lectures.

The formal solution below suggests a structure to incorporate those characteristics in an open-script design, where users can suggest new gadgets and possibilities to store/expose the stuff. The transparency and openness of the solution focus more on establishing attractive and informal connections with the user rather than offer an ultimate solution. The prototypes exhibited are also considered offering materials from the table (in combination with the scrap) they are exposed to be appropriated by other users

Besides the contributions for this RtD, Gambiarra is not a method but a problem-solving practice caused by adversities and vicissitudes from the lack of resources and inequality in the brazilian context. An inaccurate term was adopted purposely to isolate the creative potentialities of the situated practice, The aim was to explore aspects of embodied sensemaking of a marginalized practice as an alternative approach of making through improvisation and intuition that are not evident in more structured contexts. The gambiarra aspects were constantly revisited

and refined in order to not fall into a folklorization of the popular culture by decontextualizing from its real context. It is necessary to demystify any romanticism and look over the aspects with an objective perspective to explore the real essence without glamorizing poverty. The actions taken during this translation of Gambiarra aspects into this new environment were guided by Lina Bo Bardi's reflections over popular culture, which does not rely on conserving shapes and materials, but rather, on the culture's original creative possibilities, It is a dynamic living process in which a folklorization leads to a state of alienation and petrification of one's culture [5].

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