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.

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INTRODUCTION
The goal was to create a space of thinking through prototyping (TTP) to bring ideas to physicality in the beginning of user’s project at the DesignLab (Figure 1) from University of Twente. 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 workshops, mostly used in a later stage of the projects and the access requires some making experience and a previous structured plan.

Through a phenomenology perspective meanings are created in the interactions between the body and the world with no division between subject and object. Abstract ideas alone work in an ideal world while real circumstances define the course of our actions, it is suggested here a balance between making (synthesize and concretize) and thinking (analyse and abstract) through reflection in and on action [4]. For that, three frameworks [1] were adopted:

Designing in Skills (DiS) encourages designers on making their everyday practice through body skill-based experience;

Research through Design (RtD): design practice emerging into academic knowledge by building and experiencing prototypes within a specific context.

Experiential Design Landscapes (EDL): as a sensemaking method to experience concepts in a real context. The users play a central role with their daily practice to develop meaningful interactions through affordances with experiential probes (EP).

Thinking Through Prototyping: ideating on a physical context to reflect on them by making models with different materials from the final one as well as improvising in order to illustrate/develop physically a concept is a process of
emerging physical awareness of ideas through skills in which “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.” [2].

Gambiarra (figure 2) 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.

**Figure 2. Artifact for a fast evacuation in case of fiscalization (left) and the mechanical part of a vehicle (right) [3]**

Gambiarra is a situated practice from a different paradigm: the solution emerges from instantaneous and improvised process (figure 3) 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: The 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;
- 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 3. Gambiarra process diagram**

**METHOD DESCRIPTION**

A research through design (RtD) was held by observing the user's' interactions with a temporary space (EDL) through making (DiS). Gambiarra aspects were translated to this context of use. The project was developed observing a horizontal community without hierarchical actors in a 6 month ethnographic design research as a participant observer in which the EDL 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.

Embodied sensemaking was held through the materiality in an intuitive process using scrap as the material resource. By using artifacts condemned to oblivion, 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]. In another activity, rather than final products, the focus was on promoting aesthetics explorations to define desired characteristics to be converted into a material/tools criteria selection.

**Figure 4. The materials on the scrap table (EDL)**

An EDL in Design Lab (figure 4) was settled as a pilot to test the material/tools criteria and to identify user’s needs during their daily use, they were mainly students from different technical fields developing their academic and personal projects (figure 5). The interactions around the space happened in a process of going from concrete (scrap and ready-made materials) to abstract (ideas and concepts for their project’s solutions).
To solve and reflect on instant problems, smaller adjustments were held, for example, a tools organizer (figure 11, p.6) 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 concept (figure 7) was inspired by Street Stands (figure 6): flexible solutions enabling improvisation to be constantly adapted on how to display the stuff.

A 2 hour activity was held in a group of 5 participants with different profiles and backgrounds. It was documented through pictures, video recordings and a whatsapp group. To contextualize, a short explanation was given over the main goal, the Embodied perspective, the TTP approach and the gambiarra term. They were free to combine the requirements, repurpose, ignore or to add new ones. The experience took place on the current configuration of the EDL with the aim to make them create intuitively and emerged in the environment to reflect on how to interact in a TTP space with scrap in their own perspective. The ideas came through the models, tools and materials they had at hand. The prototype’s progress was documented on the whatsapp group so insights would not be forgotten, that provided other views of possible interactions for the permanent space, in each of the requirements several solutions of the activities 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.

The practical experiments were translated into requirements for a final ethnographic activity with the aim to create physical solutions for the space. The following requirements were given to the participants:

- Informal configuration (street stand concept);
- Fragmented solutions for the functions for the types of use held in the EDL: exhibit, work, communicate and store.
DISCUSSION
The EDL was constantly (re)designed during its use. The user left traces on the physical environment that guided the design decisions in the context of integrating Gambiarra aspects in the DesignLab: by stimulating and (re)adapting it to the users of a formal place. The Gambiarra aspects that guided the RtD are here translated to the following contributions:

**Instantaneous material resources**

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.

**Situated actions [8]**

Attitude is crucial in the learning process to create meaning by reflecting on the sociocultural environment through experiencing it. In-situ problems emerged through experience and were solved locally and informally by user’s affordances with freedom to modify it. As a reflection and contribution, the interactions must be flexible and spontaneous to be adapted by users to new forms of interaction dynamically and instantaneously created for a making culture to improve the learning process with engaging and empowered attitudes.

**Product that precedes the creation and improvisation**

Pre conceptualized ideas are less likely to be realistic prototyped with scrap’s characteristics than traditional prototyping materials. It stimulates improvisation from a concrete-to-abstract approach. The users are challenged to adapt to arbitrary constraints given by the scrap: the ready made shapes stimulated unexpected new affordances [7] on the aesthetic of interactions, held by the symbolic impurities of the discarded artifacts. The reuse of scrap as a material branched into a new attitude towards the EDL: user’s engagement and empowerment took place in making and communicating as a community of practice through the leftovers, experiential probes and older prototypes to be reused.

**Community of practice**

The informal configuration of the EDL emerged into a dynamic and collective attitude towards the space: 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 spontaneously (figure 5, p.3). 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.

**Contributions to the current making process scenario**

The Gambiarra workspace was a contrast to the current
state of prototyping facilities at DesignLab, already
integrated in the user’s making and learning processes. The
essence of this particular marginal practice enriched those
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, and
are hereby described as:

**Concrete-to-abstract flow:** Physical models require a more
detailed solutions for technical issues on an earlier phase
(e.g. how to assemble pieces, folding, geometry, structure,
etc.) and conceptualizing exclusively on an abstract flow
might lead those aspects to be neglected and underestimated
in the early phases, which may turn them into obstacles in
later phases of the project. By ideating through concrete, the
awareness of technical issues not only emerge since the
beginning, but also contribute to the process, bringing
creative and unexpected solutions as design opportunities
rather than obstacles to overcome (figures 11 and 12).

![Concrete-to-abstract flow](image)

**Aesthetics of manipulation:** the way we perceive physical
products and how we interact through manipulation with
the resource in the environment enhances our perception
over materiality, less based on expectations but rather, on
real experiments (figure 13).

![Aesthetics of manipulation](image)

**Working with ready-made forms rather than designing
metaphors:** Adding new meanings to ready-made
processes enabled paths through the constraints created
which evolved into a free exploration that regular software
would not provide (Figures 12 in comparison with 13 and 14). It might be difficult to go outside the predefined mindset of ideas and references, but by using the ready-made shapes one is forced to think in a non abstract but limited paradigm that leads to non conventional solutions and different ways of solving a problems: unusual constraints become motor for inventive solutions and new ideas.

**Concrete visualization of ideas:** formal solutions and concepts are better explained through models, which becomes a concrete "space of negotiation" between physicality and design decisions.

**CONCEPT REVISION**

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, imported from its real context to a different reality. 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].

**REFERENCES**


