A Non-commercial Approach to Experience Design Teaching

Interactive Systems Developed at Escola Superior de Desenho Industrial

Marcos André Franco Martins
ESDI (Escola Superior de Desenho Industrial)
University of the State of Rio de Janeiro
Rio de Janeiro, Brazil
e-mail: marc.a.martins@gmail.com

Abstract – **Experience design teaching faces the challenge of balancing two main pedagogical proposals: (1) commercially driven projects intended to satisfy market needs also understood as user needs; and (2) experimental projects, not primarily concerned with consuming, aimed at exploring innovative designs. In a design school, this problem is of special interest, since academic environment offers rare opportunities for experimentalism. Anxious about professionalization, both professors and students usually ignore those opportunities and tend to follow recipes provided by literature in the experience design field. In this paper, we propose, through the analysis of case studies, a pedagogical approach intended to stimulate both critical thinking and unexpected interactions. The prototypes presented here demonstrate that it is possible to teach and learn experience design through a non-commercial approach.**

Keywords – pedagogy; interactive design; experience design; non-commercial applications; experimentalism.

I. INTRODUCTION

The Interaction Design field has been marked by the term UCD (User Centered Design), since its coinage in 1986 by Don Norman [1]. His insight has created a shift in the HCI (Human Computer Interaction) field from the development of interactive systems focused on the product to the foregrounding of the user's needs. As it is known, this concept was the basis to the more recent field UXD (User Experience Design), made popular by (besides Norman himself) authors like Marc Hassenzahl [2], Bill Buxton [3] and Nathan Shedroff [4]. UXD implies that design is required to go beyond the creation of products and interfaces. It has to consider situations of use, which are now seen as "designable".

We suggest that both terms, "user centered design" and "user experience design" – in spite of their unquestionable importance in HCI history – have obscured, a simple fact: users, today, maybe more than ever, are not merely people who have "authentic" needs and everyday routines just waiting for a designer's enlightened assistance to fulfill those needs. Both needs and experiences are also *produced* by constant market demands from contemporary capitalism, named by authors such as Maurizio Lazzarato as "immaterial capitalism". To Lazzarato, contemporary "products" (which can be immaterial themselves, e.g., Facebook) are "producers of the needs, the imaginary and the tastes", creating and transforming the "ideological and cultural environment of the consumer" [5]. To Italian philosopher Giorgio Agamben "one single individual […] can be the place of multiple processes of subjectification: the user of cellular phones, the web surfer, the writer of stories, the tango aficionado, the anti-globalization activist, and so forth." [6].

If we agree that the user is also a *product* of economical and marketing needs, it becomes difficult to view him/her as an absolute starting point for the development of design systems, as the terms UCD and UXD may imply.

Such a complex scenario brings particular challenges to teachers, schools, universities and anyone related to design teaching: In what ways can one teach experience design today? Should we just follow the widespread understanding of the user as the starting point for any design project? Should we encourage students to base and justify their projects upon supposedly infallible recipes? If we are to understand the learning environment as a rare space for lively and independent critical debate where innovative thinking can flourish, the answer is obviously no!

This paper presents the concepts *user* and *experience* beyond their immediate commercial implications. The basic proposal is to temporarily free students from market driven rules and to encourage them to design unusual interactions. While the projects they develop are playful and humorously informal, they follow rigorous methodological steps that encompass the basic knowledge related to the design of interactive systems.

In order to present our pedagogical research and results, this paper follows the following structure: Section II gives a brief historical account of interaction design teaching at ESDI (Escola Superior de Desenho Industrial). Section III provides the schematic framing in project development employed at the School and explains the approach chosen for describing the case studies. In Section IV, we will present three completed projects: (A) a radio that can broadcast news, music and soap operas from the past, (B) a real physical tightrope that uses sound and image feedback from Nintendo's computer game Super Mario Bros, and (C) an installation in which captured silhouettes and movements of participants are transformed into colorful graphics projected on a screen. Section V sums up the essential aspects demonstrated by the case studies and indicates future developments.

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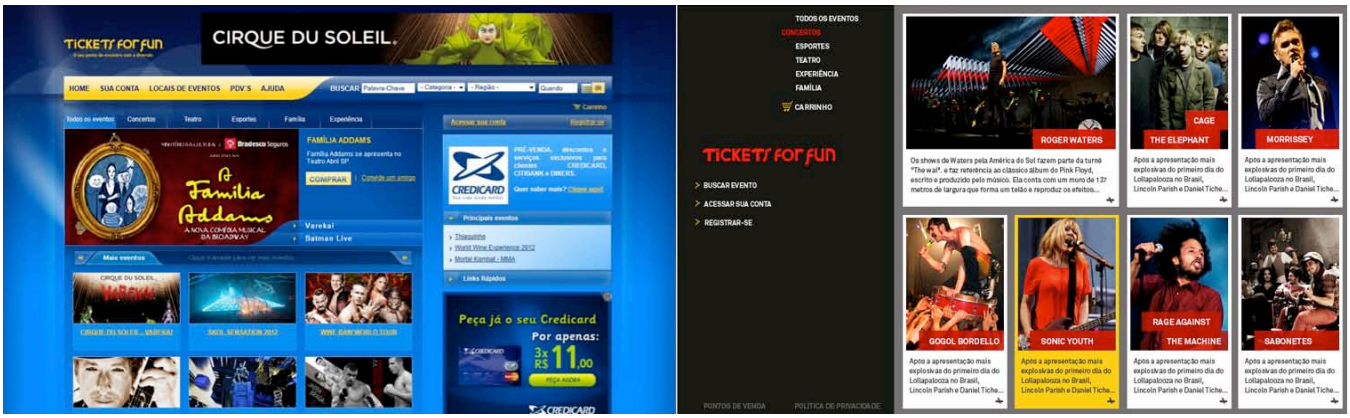

Figure 1. Before and after: Tickets for fun website re-design.

II. EXPERIENCE DESIGN TEACHING AT ESDI

In 2010, interaction design became part of the undergraduate curriculum at ESDI, a School traditionally devoted to Graphic and Product Design. Since then, we have been testing a variety of pedagogical approaches in order to develop students' interaction design skills, mainly focusing on practical project development.

Before describing the non-commercial applications, which are the focus of this paper, we will emphasize that, naturally, we have not abolished market driven assignments. In fact, when we started teaching interaction design, project proposals were based on existing products such as websites and tablet apps. In these cases, the focus was on the importance of visual clarity, semiotic concepts, analytical critique, usability aspects and user testing. In 2012, for instance, students were asked to search for a website they considered especially problematic. They had to analyze the site in terms of visual pleasantness and coherence, semantics, metaphor efficiency, usability and overall experience. Before and after images [7] show how their analysis have guided them in the search for better graphic and interactive solutions (Figure 1).

Projects like these were carried out exclusively through simulations, such as interactive pdfs and Adobe Flash prototypes. Gradually, we have introduced programming workshops on hardware and software platforms such as Arduino [8], Processing [9], Microsoft's Kinect [10] and MakeyMakey [11]. The benefits of teaching the logic of programming languages to design students are twofold: firstly, the logic of programming can free students from clichéd solutions (embedded in any commercial software package) and empower them with a critical awareness of design-presuppositions [12]; secondly, this very logic may be exported to projects other than interactive ones, since programming language foster the development of planning, synthesis and organizing skills.

It was this proximity with programming that has encouraged us – teachers and students – to engage in experimental projects not destined for commercial use. For design students who had never programmed before, learning was usually an arduous process. More often than not, they faced difficulties in getting their original plans executed as they had imagined, inevitably leading to frustration and discouragement. However, such "mistakes" could be (and in fact were) taken as creative "busters", once inventive solutions had to be called upon in order to adapt original plans to the constraints imposed by programming. There were, thus, two potential creative paths for the projects: an emerging acquisition of programming skills and the inclusion of random surprises.

Without abandoning the more commercial assignments mentioned above, we have welcomed an approach to teaching experience design that was experiential in itself and that encouraged project development as a nonlinear process. Besides that, it became accepted that a project's goal is not always initially clear and that innovative ideas can arise from a temporary suspension from the commitment to any existing system devised to be "used".

III. PROJECT STAGES AND GUIDELINES FOR THE CASE STUDIES

Flexible and free as the following cases may seem, the employed pedagogic methods for their development have strict pre-defined traditional stages:

- Theme assignment.
- Research.
- Brainstorming.
- Project proposal.
- Low-fidelity prototyping.
- Sensorial design.
- Programming.
- User testing.
- High fidelity prototyping.
- Final demo film.

This sequence is merely a suggestion, since any one of these phases can be (and usually is) revisited and/or anticipated: for instance, a group of students in the brainstorming phase may want to jump ahead and create a quick low-fidelity prototype to fast test their ideas; another

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group whose design is well advanced may want to go back to research, led, say, by unexpected programming or sensorial design issues.

Given such flexibility, it would be deceiving to present the following case studies strictly under the above linear sequence. Instead, we have chosen to present all three cases according the following sequence:

- Project overall description.
- Relevant development issues and turning points specific to each project.
- Main achievements and innovative contributions.

IV. CASE STUDIES

A. *Scheidemann Radio*

A haunted radio that transmits music, soap operas and news from 1939 to 2012 was the proposal of a group of students for the given theme "Remix". In this assignment, students were required to search for an out-of-order object and assign to it new functionalities.

In project Scheidemann [13], an old radio was conceived as interface for a databank containing sounds from past decades. When turning a radio knob, the user could choose which category to listen to (music, soap opera or news) and combine this choice with a time selector (another knob) in order to choose a specific date. Besides this content, a mysterious character was said to "inhabit" the radio. This was Viktor Sheidemann, the device's creator, who intended his invention to predict the future. His life had ended in a tragic suicide, followed by the capturing of his soul by the radio. Since then, his voice interrupts randomly the radio transmission uttering Viktor's memories and predictions. If one listens to the radio long enough, one will be able to recompose, out of the fragmentary narrative, all relevant facts of Viktor's life.

In the project's early phases, the radio would offer little interaction. It would be standing in an ordinary busy environment, like a restaurant or a classroom, occasionally turned on by movement sensors. The project's authors

Figure 2. Radio Scheidemann's low fidelity and experience prototyping.

imagined a situation where people would suddenly be made aware of the radio and get curious about its bizarre behavior. To better analyze the potentialities of this plan, a cardboard-made low fidelity model was used for experience prototyping. The students enacted and filmed what they imagined would happen in a real situation (Figure 2). Two of them played common passers-by who would, they presumed, be surprised by the device, while another one, using the "wizard of Oz" technique [14], would hide behind the radio and manipulate both sound transmissions and a clock pointer which should indicate a date in time.

The film revealed little level of interaction and this poorness could potentially weaken the overall idea, as it depended too much on little sensorial appeal. They, then, resolved that the radio should have its knobs activated for interaction. Besides that, they decided to create, in the school's basement, a scenographic setting which included Viktor's diary sheets on the floor, spider webs hanging from the ceiling, a glass of water half emptied (his last one?), an open book, and finally, the radio (Figure 3).

Radio Sheidemann was a successful project, attracting the curiosity of a wide variety of users. During the project's development, students were able to understand design as an activity that needs to consider, besides the product itself, architectural, sensorial and behavioral issues, i.e., experience design typical concerns.

Figure 3. Ambiance and Radio Sheidemann.

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Figure 4. Super Slack Bros' installation.

B. *Super Slack Bros.*

In the summer of 2014 slacklining (or tightrope equilibration) was the hit sport at Rio de Janeiro's beaches. A student came out with an original idea: an outdoor installation that would bring Nintendo's 1990's game Super Mario Bros to physical reality [15]. The piece may be described like this: interaction starts when someone jumps up a slackline stretched between two trees. He/she receives "stage accomplished", "win" and "fail" sound feedbacks imported from original Mario's soundtrack. As the user evolves on the line he/she advances on game stages, just as in a typical computer game. The "scoring" system also includes the touching of real Mario Bros' icons (printed and mounted on cardboards) that hang from another stretched line located above the user's head (Figure 4).

The basic technical setting is the assemblage of two wires (one phase and the other one signal), on the slackline, that close electrical circuit when the heel and the instep of one feet touch simultaneously the different wires. These wires are connected to MakeyMakey's input slots, which substitute for the computer's inputs (keyboard, mouse, etc.). A Processing code receives those inputs and retrieve appropriate sounds from a database. The same technique is used for the activation of the icons hanging above.

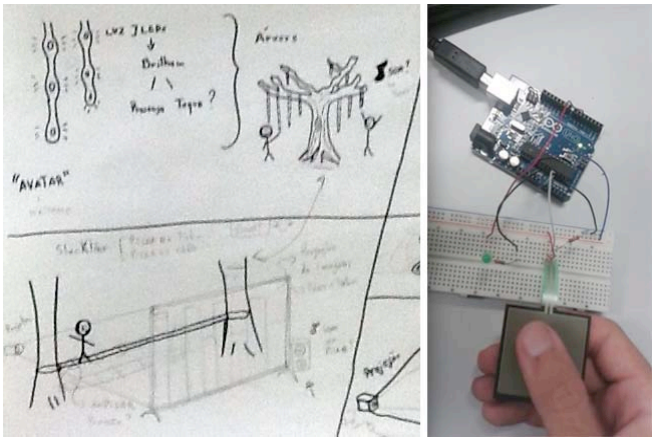

Figure 5. Super Slack Bros. First ideas and initial pressure sensor based technical solution.

In the initial plan, the input was thought of in terms of pressure sensors (Figure 5). It took many experience prototypes and intense research until the idea of a feet-closing circuit was devised. The overall experience was also refined: the student abandoned his original idea that included lights' feedback and opted to use exclusively sound, since light proved to be a distraction to a user trying to balance on a rope.

This remarkably original project attracted a lot of attention, including MakeyMakey's creator, Eric Rosenbaum's [16]. When the functional prototype was installed, a lot of people were eager to experiment with the modified game. But, besides such success, the system also provided food for thought in what concerns our intensely virtual and digitized culture. Super Slack Bros., by inverting the usual path from real to virtual, was a humorous and ironic commentary on today's widespread arrest of physical reality.

C. *Psychokinectic*

Developed in 2015, over the assigned theme "Movement and Color", this interactive system was a Microsoft Kinect-based application [17]. The system works like this: users' movements and body contours are continuously captured and sent to a computer. Through Processing Language, the contours define an area to be filled with various graphic and video elements.

This technical setting involves software and hardware knowledge usually unfamiliar to design students. During the project's developing process the authors undertook strenuous tests and research of Kinect's body recognition capabilities. They have also investigated Processing Language and Resolume Arena software in order to mix images and silhouettes in real time. The code was based on libraries Syphon and Kinect Projector Toolkit [18].

In technically complex projects like this, it is not uncommon that students get so busy researching and debugging software and hardware that they tend to neglect fundamental aspects of experience design. Almost close to

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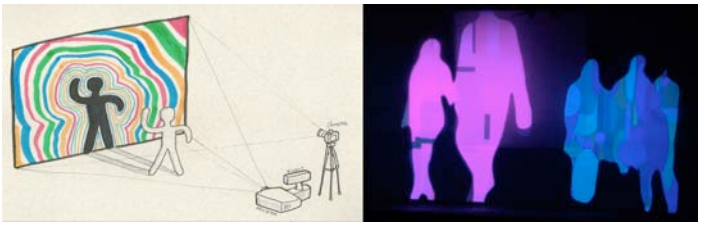

Figure 6. Psychokinectic's first draft and early imaging tests.

Figure 7. Psychokinectic's experience prototyping.

the project's final deadline, challenging conceptual problems arose. Since the very first drafts (Figure 6), there was an arrangement of actors and devices that remained unchanged: the user was expected to stand facing the projection and the Kinect's sensor and the projector would stand behind him/her. Initially the resulting shadows derived from this setting were intended as part of the project. But technical investigation had led the students do decide that images would appear inside and not outside the body's contour, thus making any shadow improper.

It was only when the main technical issues had been solved, that filmed experience prototypes were possible, revealing experiential problems. As the user interacted with the system, his/her attention was locked to the screen (Figure 7).

This disposition generated two problems. Firstly, the user's shadows, initially part of the concept, actually made it difficult for one to see what was inside the silhouette and, secondly, participants became "hypnotized" by the images, what resulted in low-level interaction amongst users themselves.

The original project's concept, framed in terms of "how to create a user experience in which the body could control images" was reformulated as "how to create a projection that interacts with user's movements without forcing his/her attention to be locked to the projection's plane". Their solution was to elevate the whole set, by hanging the screen on buildings from two sides of a street (Figure 8).

In the end, the system was finally tested and validated as a device for dance parties, such as one organized by student's themselves at the School. The final setting allowed people to interact with the system, without having to enter a specially prepared closed room. Therefore, Psychokinectic's originality was that of serving both as party decoration and interactive piece – an experience that was neither immersive nor theater-like.

V. CONCLUSION AND FUTURE WORK

This paper has demonstrated the qualities of a pedagogical method not based primarily on the user. We are hardly suggesting, though, that commercial concerns are to be forgotten in a design school, or that users are unimportant. The point addressed here is that there may be gains if we temporarily suspend those concerns. The focus on the design of the experience in itself, apart from any predefined or supposed "needs", has made it possible for students to both understand how to formulate design problems in terms of experience and to develop creative projects. In spite of not having any particular user in mind they were able to attract and enchant those who undertook the designed experiences.

Perhaps this approach points to a more flexible understanding of the user as someone who can profit emotionally and intellectually from engaging in unexpected settings, rather than solely having his/her needs quickly fulfilled. Besides that, these projects, due to their emphasis on physical collective experiences, are also critical statements against the immaterial seclusion typical of social networks. They envisage alternatives to a kind of sociability composed by lonely users, connected to one another and to the world mostly through screens.

As for future developments of the work presented here we shall pursue both external and internal endeavors. On the external level, we have been establishing connections with other design schools across the globe so as to promote collaborative initiatives following the methods described above. Internally, we plan to introduce, in our interaction design courses, a more effectively blend between commercial and non-commercial approaches, encouraging students to find inspiration in the experimental results in order to the create innovative marketable products.

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Figure 8. Psychokinectic screen's final setting and party with the actual working system.

REFERENCES

[1] D. A. Norman, The Psychology of Everyday Things. New York, New York: Basic Books, 1988.

[2] M. Hassenzahl. “User experience and experience design,” in Interaction Design Foundation. <http://www.interaction-design.org/printerfriendly/encyclopedia/user_experience_and_experience_design.html > [retrieved: 03, 2016].

[3] W. Buxton, Sketching User Experiences: Getting the Design Right and the Right Design. Amsterdam; Boston, Massachusetts: Elsevier/Morgan Kaufmann, 2007.

[4] N. Shedroff, Experience Design 1. Indianapolis, Indiana: New Riders, 2001.

[5] M. Lazzarato and A. Negri, Capitalismo Imaterial [Immaterial Capitalism]. Rio de Janeiro, RJ: DP&A, 2001.

[6] G. Agamben, What is an Apparatus? and Other Essays. Stanford, California: Stanford University Press, 2009.

[7] C. França, C. Ribeiro and F. Chaves, Tickets for fun Rededign, unpublished.

[8] Arduino official site. <https://www.arduino.cc/> [retrieved: 03, 2016].

[9] Processing official site. <https://processing.org/> [retrieved: 03, 2016].

[10] Kinect for windows. <https://dev.windows.com/en-us/kinect> [retrieved: 03, 2016].

[11] MakeyMakey official site. <http://www.makeymakey.com/> [retrieved: 03, 2016].

[12] M. A. F. Martins, "Prototyping in a learning environment - digital publishing projects from the Escola Superior de Desenho Industrial," in Design, User Experience, and Usability. User Experience Design for Everyday Life Applications and Services. vol. 8519, A. Marcus, Ed.: Springer International Publishing, 2014, pp. 195-206.

[13] C. Martins, F. Chaves, L. Ribeiro, Radio Scheidemann, unpublished.

[14] J. Preece, Y. Rogers, H. Sharp, Interaction Design: Beyond Human-Computer Interaction. New York, New York: J. Wiley & Sons, 2002.

[15] Y. Santos, Slack Line Bros, unpublished.

[16] Slackline Bros. <https://www.youtube.com/watch?v=J-pBbwFUXN0> [retrieved: 03, 2016].

[17] R. Bortolami, C. Menezes, N. Borba, D. Rocha, T. A. Dias, Psychokinectic, unpublished.

[18] Genekogan Library. <http://genekogan.com/> [retrieved: 03, 2016].

 ISBN: 978-1-61208-468-8