

# Researching usability in Rio de Janeiro, Brazil: does the interactive industry echo academia?

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## ABSTRACT

This article presents a research about interface usability and human-computer interaction made in Brazil, which are developed in university laboratories and interactive media companies. The work is focused mainly in research made at PUC-Rio Arts & Design Department and at the Globo.com usability laboratory, both in Rio de Janeiro, Brazil.

## Keywords

Interface usability, human-computer interaction, usability tests, ergonomics

## INTRODUCTION

In the last decade, Internet became part of our lives. Póvoa (2003) believes that this is the biggest channel of distribution and collection of information of human history.

Inserted in a very short historical period, in which we are able to consider only 9 years of commercial development, the web environment is still in its infancy in regards to its usefulness.

Because of the fast technological development, we realize that devices and software are becoming more advanced in terms of technology and also more complex, focusing only on the interests of developers and companies. Those, attempting to modernize can get caught in a cycle and wind up ignoring their customers (Zilse, 2003).

A phenomenon that appears in new media, that few study, is the proliferation of politics of trial and error, using solutions based only on empiricism, like in the metaphor suggested by Nielsen (2000): “The Mud-Throwing Theory of Usability”, when developers throw it at the wall and see if it sticks. O que ocorre é que a maioria das decisões de projeto são totalmente baseadas em experiências anteriores, sem nenhum tipo de teoria ou aspectos metodológicos confiáveis.

This phenomenon happened mostly in the beginning of Web development, when there was a great demand. Since that time, and until today, the majority of websites is developed without any scientific knowledge, unconcerned with the cognitive subject or good usability.

This article shows a panorama of interface usability and human-computer interaction studies that are being carried out in Rio de Janeiro, by university laboratories and also by interactive media companies. The goal is to contribute in the reduction of the practice of trial and error, using research findings focused on the Web. These works have successfully used scientific concepts in the design process.

## ERGONOMICS AND USABILITY RESEARCH

According to Preece (1993): Ergonomics is probably the discipline most studied in human-computer interaction - since the sixties.

Booth (1992) declares that although there is a general agreement about the existence of human-computer interaction as a multidiscipline area, not all disciplines participate equally in the HCI area. By now, we can emphasize that there is no leadership of computer sciences in that area. The author considers, in a matrix, an interaction of phases, objects of development and disciplines implied. It's possible then to clearly verify the importance of ergonomics, and it's appearance in all moments of research and projects.

According to Moraes (2003), Stanton and Baber from one decade of work - Shackel, Eason and Booth suggest the following factors that can explain the usability concept and to define its target.

- **Easy to learn** – the system should permit that users reach acceptable levels of performance in a specified time;
- **Effectiveness** – an acceptable performance should be reached by a definite ratio of the user

population, in relation to a limit of variation of tasks and a limit of environments variations;

- **Attitude** – an acceptable performance should be reached considering acceptable human costs, in terms of fatigue, stress, frustration, discomfort and satisfaction;
- **The perceived utility of the product** - Eason (1984) observed that “the biggest usability indicator on a product is if it’s used”. Booth (1989) emphasizes that it would be possible to project a product considering factors like learning criteria, effectiveness, attitude and flexibility, but even tough it can be simply not used;
- **To get adjusted to the task** - beyond the considered attributes above, a product “usable” should represent an acceptable adequacy between the offered functions by the system and the users necessities and requirements;
- **Tasks characteristics** – the frequency that a task can be played and the degree in which the task can be modified, in terms of variability of the information requirements.
- **Users characteristics** – another aspect that has to be included in a usability definition refer to knowledge, ability and motivation of the user population.
- **Flexibility** – the product has to be capable of leading with a limit of variation of tasks beyond the ones initially specified.

#### ACADEMIC RESEARCH REGARDING USABILITY IN RIO DE JANEIRO, BRAZIL

Until today, there are still no masters or doctorate degrees dedicated exclusively to ergonomics in Brazil. This area is studied as a research group in masters and doctorate courses in areas such as Design, Architecture, Industrial Engineering and Computer Science.

In PUC-Rio, beyond the Arts & Design Department, the Computer Science Department also research interface usability. Up to 2003, beyond these two research groups in Rio de Janeiro, there were also other groups in regions of the country like Brasilia (UNB - Universidade de Brasília), Paraná (UFPR - Universidade Federal do Paraná), Santa Catarina (UFSC - Universidade Federal de Santa Catarina) and Pernambuco (UFPE - Universidade Federal de Pernambuco).

For this article specifically, the research will be focused on the PUC-Rio Arts & Design Department research group called LEUI.

Despite the great number of undergraduate courses in Industrial Design in Brazil, the first master’s degree in Design was created appropriately by this department in 1993, as well as the first doctorate degree in 2003, ten years later.

In 1994, in that same department, the group of Ergonomics research was created. And in 1997, the

research group called “Design: Ergonomics and Usability and Human-Computer Interaction” was established.

Two years after the creation of the research group, the Ergonomics and Interface Usability in Human-Technology Systems Interfaces Laboratory (LEUI), was founded, coordinated by Prof. Anamaria de Moraes and Prof. Claudia Mont’Alvão. Today LEUI has a team of 3 PhDs students, and about 30 students distributed in the undergraduate and masters degrees courses.

#### Usability research at LEUI

Since its foundation, LEUI represents PUC-Rio in conventions in Brazil and abroad, producing knowledge in the HCI area, and also in other Ergonomics subjects as: Products and Processes, Information Systems / Informational Ergonomics, Ergonomics in the Built Environment and Transport Systems.

As of March of 2004, 22 M.Sc. dissertations were completed, in which 7 were about HCI. There are still 8 dissertations about interface usability being developed, and 3 doctor’s degree thesis are being produced.

The LEUI’s academic production also has more than 40 articles published specifically on interface usability and human-computer interaction.

#### Research and development until 2004

While developing these dissertations, some of the students created usability tests in their research. Because of the implementation process of the LEUI usability laboratory, which is not finished, the tests had been made in environments created for the experiments (fig. 1).



Figure 1: Example of environment created by the students.

Different from the market reality, the tests created at the academy don’t use a great amount of money to be applied. Moreover, the time to develop tests is foreseen in the dissertation planning, which takes 2 years of development.

It is common for tests created at the university to include a large amount of users in the experiment. Santa Maria (2002), cited the number of subjects that participated in legibility studies made by numerous researchers: Richaudeau (1969) tested 49 people, Gould et al. (1990) 46, Moraes et al. (1996) 40, and so on. Of course this is not a rule, because lots of researchers test only a few users, but it is interesting to note this numbers. For many reasons, this doesn't seem to be the usual procedure in the industry.

Nielsen (1993) has shown in his article "Discount Usability Engineering" that usability tests do not necessarily need to involve much money. He affirmed that even without a usability laboratory and testing just a few users, the tests would get a satisfactory result.

This theory shows that valid scientific results can be achieved without a sophisticated structure, which would require greater investment not only for its construction but to carry out the experiments.

The tests accomplishments are part of the research, and in some cases it is the main point of the dissertation. From the tests, data that will contribute to reach the results are generated, and the hypothesis confirmation or negation will be defined.

#### **Research findings**

Since the first Master's dissertation about HCI by a LEUI's student, defended by Padovani in 1998, a few interesting findings have been made contributing to this research area in Brazil. This section of the article will be devoted to some of these main findings made by Padovani (1998), Santos (2000), Caldas (2002) and Santa Maria (2002).

#### **a) Padovani (1998): Ergonomic Evaluation of navigation systems in hypertext**

In her research, the author concluded that some characteristics of navigation systems (as for example, the appearance of links and aids to identification of navigation links) influence a user's navigation strategy within closed hypertext systems.

According to her results, there is a difference in the navigation performance depending upon the way that links appear. In her research, links with the appearance of buttons (using effects that suggest a three-dimensionality and include a button caption) were more efficient than the other two models: links represented by underlined words (with a cursor change when hovered over), and links represented by images (with temporary windows displaying the hyperlinks name to aid in its identification).

According to Padovani (1998), most of the users (66%), affirmed that their preference was associated with the certainty that the button is always a clickable object. A possible answer for that preference, according to the author, is the analogy with buttons of other non-computerized devices or to buttons used in computer interfaces before the advent of hypertext.

#### **b) Santos (2000): Heuristic Boarding For Evaluation of Interface Usability**

The purpose of the research was to contribute to the growth of HCI studies in Brazil, to the knowledge of usability issues, and to promote the development of more usable interfaces.

The research was conducted by applying the heuristic concepts purposed by Nielsen and Molich in the 1990's in evaluating CNPq's website. CNPq is The National Council for Scientific and Technological Development, a foundation linked to the Ministry of Science and Technology (MCT) which supports Brazilian research.

The heuristic evaluation was applied with five experts, each one with a different background. Several problems were found in the interface. After the inspection, the evaluators assigned levels of severity to each of them.

The results showed that the heuristic evaluation is an effective tool to be used in the interface design cycle. The results have also showed that the ergonomic design recommendations must be applied, taking into consideration all the elements that compose a HCI system (user, task and environment) and not an isolated manner which considers only the surface of the interface, but in a consistent way, according the ergonomic quality requirements.

#### **c) Caldas (2002): Optimization of the Dialog User-Organizations in the World Wide Web: A Case Study and Ergonomic Evaluation of Usability and Human-Computer Interaction**

This project's theme addressed some issues related to Ergonomics, HCI and the design of websites. The objective was to discuss methods of optimizing the presence of organizations in the World Wide Web by considering the user's goals, needs, opinions and tasks. Therefore, it was a descriptive research as well as a case study.

The research problem was that users of the Senac's website (Service of Commercial Learning, a large Brazilian agency devoted to professional education) stopped navigation and evaded it altogether when they reached the organization's homepage.

Caldas (2002) concluded that the homepage of a specific group of users is not usually adequate to support the tasks they would like to complete, nor others' needs.

Based on the results, the author developed 15 guidelines for designing corporate portals for large organizations.

#### **d) Santa Maria (2002): Ergonomics and Human-Computer Interaction: Legibility of Computer Video Terminals**

The research consisted in an experimental research and aimed at improving the reading and presentation of electronic text in documents, word processors and on the Internet. Through a careful study of other researches in the area it tried to define parameters for readable and more user-friendly electronic texts.

The experiment was divided into two phases, both testing the x-height (height of the very small characters of a type, excluding ascendants and descendants) of a specific typeface and the letter space. On the first phase, a text was presented using sans serif types, on the other using serif types (both in PDF format). The tests were applied to 36 subjects and verified that the x-height increase contributed to VDT (video display terminal) reading, specially for sans serif types, by decreasing the reading times.

The experiment also verified that sans serif types are read more efficiently than serif types in electronic media.

#### **USABILITY RESEARCH CONDUCTED BY INTERACTIVE INDUSTRY**

Lots of Brazilian companies who create websites do not focus their projects on the user experience. Perhaps because of this, only a few people are interested in researching about product usability.

However, some companies adopt a very interesting user centered project methodology. In Brazil, we have examples like Globo.com and Sirius Interactive Solutions, among other, who adopt proper workflow methodology and divulge its results in conventions, lectures and other media.

This initiative contributes to the advance of the study in this area in Brazil, and is extremely important for making it possible to compare what is considered in academia and what is developed by the market.

Póvoa (2003) affirms that the general quality of the user experience leads to the failure or success of an Internet product.

The development of this kind of work is not as easy as it seems because of the economic model we take part in.

In this modern capitalist world, productive competitiveness is a necessary element for our survival. People need more time to work: research, create, project, and develop, to produce the biggest amount of work in the lesser time possible.

Advances in the scientific and technological areas, and the fast sprouting of new forms of communication and information exchange, are a great ally, and a fuel of high power for the capitalist society.

This search for rapidity, for exploitation of the "time-to-market", or either, the time of fond determined product in the market, generates pressure around the development, disabling a more careful project.

Decisions made by professionals in the markets apex of the alimentary chain, result in products created from empirical data, with solutions resultant from politics of trial and error, as we saw previously.

Culturally, top corporate executives of Brazilian companies have the perception that the interface evaluation stage results in a waste of time before launching the product as well as a waste of money in development. To paraphrase Nielsen (1993), Vice

Presidents are not users. Their intuitions about what makes for great design may not be accurate.

Póvoa (2003) affirms that when usability engineering enters as an element in the project process, there's an increase in the consumption of time and budget waste in the development cycle. Although, we can assume that this additional consumption of time waste on usability studies generates a positive impact in the quality of the project. This impact must increase the possibilities of this product to reach its return of investment, as sells, audience, etc.

Because of all those existing difficulties, companies who implement usability tests and a user centered design methodology have a great value. They have perceived the importance of usability for the product success, they survive in a market where the majority of customers do not understand that the benefited ones do not have to be them, but those who will use the website created.

The respected American company 37 Signals, that offers services focused on good usability and simplicity, authors of the book "Defensive Design for the Web", show on their website a very interesting concept: "We work with smart clients who understand that it's the customer, not org-charts or office politics, who matter most. These clients are hard to find, so when we get them we treat them well".

In Brazil, Globo.com is pioneer in creating a dedicated laboratory exclusively to usability testing. Globo.com is the on-line presence of the companies that compose the Globo Organization, one of the world's largest communications group. It's this company that we will focus on in the remainder of this study.

#### **Interfaces usability at Globo.com**

Since its launching, in March of 2000, Globo.com offers in its portal news, email, chat, e-commerce, and others services. Beyond those activities, it's the Globo company responsible for the creation of a great part of the groups Internet products like soap operas, reality shows and programs websites.

In the end of 2002, the company had changed its marketing strategy to be an Internet provider and sell TV Globo's content on the web.

The in-house creative department, is responsible for all these projects. This area is divided in three work groups:

- Information Architecture;
- Interface Design;
- Branding.

The branding professionals focus their work on graphic design. They are responsible for communicating the message that must be transmitted, reflecting the attributes of the brand, its emotional personality and characteristics that should be associated to the product.

The Information Architecture and Interface Design teams focus their work on usability and user experience.

Fleming (1998) affirms that information architecture is essential for navigation design, being related to content, strategy and resources. The author of the book *Web Navigation* says that efficient information architecture process has three training periods: conceptual research (information collection), design (idea generation) and production and operations (documentation and maintenance).

The interface design work is well defined by Mayrinc (2003). He affirms that this work stage can be seen as a plan of the main screens, in which the weight of each element will be communicated, which elements will be contained there, and the main navigation flow and interaction.

These two groups, Information Architecture and Interface Design, are responsible for developing projects and also for planning and executing evaluation of products that are on-line.

Pinheiro and Klemz (2003) affirm that the Creative Department's main objective is to develop a variety of products that are easy to use, consistent between each other, and also take care of the user necessities and experiences.

### Design methodology

The Globo.com project methodology is very clear. It can change slightly depending on the project, but in most case it can be organized like the following:

1. Demand / Strategy definition
2. Benchmark
3. Survey of desired functionality (Brainstorm)
4. Complete Information Architecture
5. Technological viability verification
6. Project development
  - a. Information architecture detailing
  - b. User experience design
  - c. Interface design
  - d. Branding design
  - e. Adjusts
7. Implementation (HTML)
8. Launch

Occasionally, when there's sufficient time and budget for project development, usability tests are used help in future redesigns.

These tests can be created in the company's usability laboratory, constructed in 2001.

### The Globo.com Usability Laboratory

Directed by Mr. Marcello Póvoa and coordinated by Mr. Mauro Pinheiro, the Globo.com Usability Laboratory launched in July of 2001, as Latin America's first in-house laboratory exclusively

dedicated to usability test of web devices. The laboratory is located at Globo.com headquarters, in Rio de Janeiro, Brazil.

One of the many references used in the construction of the laboratory was the model suggested by Nielsen (1993) (fig. 2).

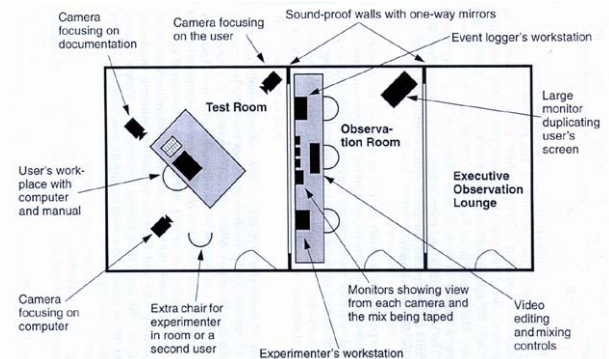


Figure 2: Floor plan for a hypothetical, but typical, usability laboratory.

The laboratory has enough equipment to register the test in different ways (fig. 3). In addition, a human resources company is responsible for finding users with a similar profile to the target public of the product. Moreover, a psychologist is responsible for conducting the tests and helping the subjects. This methodology results in extra cost to the project.



Figure 3: Example of test conducted in the Globo.com laboratory.

Nielsen (1993) estimated that based on findings from surveys, current best practices call for devoting about 10% of a project budget to usability.

The same Nielsen (1993) said that there are some extra costs from usability testes that may or may not be formally charged to the usability budget for the specific project, depending on how the company's account mechanisms are set up. Typical cost elements of a user test are:

- Usability specialists to plan, run, and analyze the test: out-of-pocket expense if consultants are used
- Administrative assistants to schedule test users, enter data, etc.
- Software developers to modify the code to include data collection or other desired test customization

- The test user's time: out-of-pocket expense if outside people are hired for the test
- Computers used during testing and during analysis
- The usability laboratory or other room used for the test
- Videotapes and other consumables: out-of-pocket expense.

As can be observed, both in the infrastructure and test methodology adopted by Globo.com as well as in that suggested by Nielsen (1993), the organization and test application costs normally make up a considerable part of a project's cost.

### Researches developed until now

The Globo.com products are constantly evolving, either for technological reasons, for changes in marketing strategy, or for modifications suggested by usability tests results.

Even before the construction of the usability laboratory, the Information Architecture and Interface Design teams were already creating usability tests. The products tested up until the beginning of 2004 were the following: Globo.com portal, Kit.Net, GloboMail, GloboNews, Tilt (a game center), Central do Assinante (member helpdesk), Assine Já (for those who want to become a member), Paparazzo, GloboFácil, Clique Com a Gente (project created by the Brazilian government) and Globo Media Center.

The results of the tests were of great use, helping in the redesign process of all these products.

### Research Findings

Among all the cited research, we can highlight the first research experiment conducted at the laboratory which dealt with GloboMail (Globo's e-mail tool) and the analysis done of Kit.Net (the portal's tool for personal website creation).

#### a) GloboMail

Pinheiro and Klemz participated in the team responsible for this research. They presented a case study about the GloboMail at CLIHC in 2003.

This application has undergone a great deal of modifications after a series of usability tests were applied in different moments. Different kind of tests were used throughout the experiment with the intention of improving upon the product.

For the first redesign, the team considered the results of the first usability test conducted by the company. From these results, functions like the possibility of accessing external e-mail accounts and a better use of the "trash can" were implemented as well as a complete redesign of the iconographic system and of the interface itself.

On the second redesign of the tool, two different research methodologies were used: focus groups and task oriented tests. These modifications focused more on the emotional aspects of the communication: changes

in the color palette, icon design and information arrangement on the screen.

The third redesign, motivated by the company's change of marketing strategy, in 2002, used a heuristic evaluation conducted by the interface design and information architecture teams. Based on that, the product was modified with relation to functionality and mainly in the interface itself.

The most used procedures during Globomail's redesign period were intermediate analysis and heuristic evaluations due to ease in implementation, the low costs and the speed. Other procedures used were the focus groups and the usability testing with users.

#### b) Kit.Net

The case study for Kit.Net, a product responsible for a great part of the Globo.com's audience, was presented by Mr. Marcello Póvoa, Globo.com's former creative director, else at CLIHC, in 2003.

The main concern of the author was the return on investment (ROI) made in usability engineering for the Kit.Net project.

The product was launched with the goal of reaching market leadership in the Brazilian personal websites category. After a benchmark of the current market leaders, it was concluded that the development of a more user-friendly application would be a competitive advantage since the competitors, despite having entered the market first, did not value ease of use.

One of the most important issue in the project's development methodology was the definition of the users' profile. The target audience was divided into two extremes, depending on their knowledge level: heavy users and light users.

The first group, the one with the more experienced users, wanted a short way to accomplish the tasks, even if this didn't mean an intuitive interaction solution. Those users will probably develop their pages directly in their computer coding them in HTML, and will use Kit.Net only as a host server.

The inexperienced users group needs a more intuitive and didactic interface. Normally the user is unsure of himself, therefore, the system needs to be projected in a way to generate confidence during the interaction process.

After the project's conclusion, the product was tested with real users, selected for their usability profile among the predominant Brazilian Internet user profiles.

The tests were conducted in the company's usability laboratory, with an interlocutor, using task analysis and "natural use" methodologies. Then, the site was redesigned based on the research findings.

With the use of usability engineering in the design cycle, the product development was more expensive and took more time, generating an additional investment in the budget. At the same time, this additional cost showed a return because of the product's success in

predefined metrics based on audience generation. Kit.Net obtained, in February 2003, the market leadership.

## CONCLUSIONS

We can observe, considering the research findings that we've seen in this article, that in the academic community, as well as in the Brazilian interactive media industry, user experience research is being used successfully.

It is interesting to note that in the Web interface usability realm, the interactive industry is as advanced as the academic community, as opposed to other areas we have researched. We can also perceive some differences between these two environments.

The first difference that becomes evident, is the importance of the knowledge base, which is studied in more depth in the academic circles than by enterprises. Berkun (2004), who worked for many years at Microsoft, also realized that much of what is taught at the university level is fundamental enough to make it easy to learn any more sophisticated subject.

During the article, we could conclude that in the interactive industry, there are two main problems: time and money. Amongst these two factors, time is still more problematic. The majority of products have a very short period to be created.

In many companies, the culture is still that the research and usability tests are a design methodology that generates a delay in releasing the product and a higher cost for the company.

However, companies who develop this type of work are very few. The majority of research development is still made in universities. Moreover, we can observe that the results made by academic studies usually can be generalized, or have a wider window of application for future research in the area.

During this study, we could conclude that the budget used in research conducted by universities is very inferior to that of companies, but the results are no less significant. These tests don't necessarily need a large amount of money, as we saw in Nielsen's (1989) article.

A possible solution for companies to create usability tests in their product development cycles would be to make to reduce the costs by cutting certain expenses.

The interlocutor, normally a psychologist that leads the test, can be substituted by a duly trained interface designer (that knows tested product well). This is already being done in the academic studies, where the student conducts his own test.

Another possibility of cost reduction is the conscription of volunteers to be tested, also being done by the academic researchers. A partnership between companies and universities would be a boon for this type of research, as both sides would win.

This reduction of cost would also generate a consequent reduction of bureaucracy speeding the accomplishment of the tests and of all the process.

These factors, with reference to the time and cost reduction, allied with arguments that show that the tests generate return on investment, can contribute in a decisive manner to change the perception of wastefulness of hours and money in the user-centered development cycle by top corporate executives.

Finally, we can conclude that in Brazil, the academic community and the interaction media industry, each with its own characteristics, can work together for the development of knowledge in human-computer interaction. For that contribution to be effective, both should present their results in conferences, seminars and scientific journals. This contribution will help the development of studies in ergonomics and human-computer interaction.

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