

Evaluating the Usability of the Mobile Interface of an Educational Website

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Abstract - This article presents the experience of an evaluation of usability on the first version of the mobile website of the National University of La Plata, Buenos Aires, Argentina. We will present the main characteristics of the traditional website, providing data representative of the amount of information it handles, the sample of participants and their profiles, the characteristics of the test, its organization, the design of spreadsheets used and the diagram of tasks the participants completed during the course of the evaluation.

It is worth mentioning that the evaluation of this prototype constitutes the starting point for the execution of subsequent stages of redesign and reimplementation, within a methodological framework of adequate reengineering and prototyping.

Testing prototypes of the mobile interface, working with samples on different user profiles, in different contexts and in different cell phone models, will result in the delivery of a product whose quality of use has already been tested and consolidated.

1. INTRODUCTION

Mobile technologies have become very popular in Argentina, especially regarding the use of cell phones. It is considered that in our country, the number of active mobile phones in April of this year had reached 37 million, 35.5% more than the same month of last year. [1]

This ongoing tendency in the youth population and even in low-income citizens makes it necessary to have educational websites which allow access from wireless devices. Such is the case of Indiana University [2], the University of Baltimore [3] and Cornell University [4], all located in the United States. In Europe, The Wireless University Forum [5] encompasses all the European universities interested in the development of software and wireless technology.

For this reason we began working in a project to provide mobile access to the website of the National University of La Plata [6], by means of the realization of an adequate user interface for mobile phones. The website of the UNLP is second in position in the national ranking of universities on the Internet, after the website of the University of Buenos Aires and before the Universidad Tecnológica Nacional and the University of Córdoba. It is also 22nd in the Latin American ranking, led by the National University of San Pablo. The ranking was elaborated by the Spanish National Research

Council (Consejo Superior de Investigaciones Científicas de España, CSIC), according to their own cybermetric indicators [7].

The National University of La Plata has over 90 thousand students, 10 thousand teachers and over 40 thousand graduates. It is constituted by a university system comprising 17 faculties, 5 pre-university schools and 9 museums, with over 100 degree courses and over 100 postgraduate courses. All are dependencies which are scattered geographically in different sectors of the city [8].

According to the Google search engine, there are around 292.000 web pages under the domain unlp.edu.ar. These data illustrate the immensurable amount of information the website handles, as well as its level of heterogeneity and dispersion. They also indicate the many different user profiles which access the site, with different queries, interests and tasks in mind.

The completion of the mobile website of the UNLP will allow our university community, administration staff, students, teachers, non-teaching staff, potential students and other visitors to access essential information regarding the University, using their mobile phones with access to the Internet.

All this complexity implies a great design challenge, as the version of the website must be more reduced, as required in mobile interfaces, with a more restricted content, more succinct information, with a simpler browsing, due to the great limitations of the screen.

II. GENERAL CHARACTERISTICS OF THE WEBSITE OF THE UNLP

The National University of La Plata is constituted by a university system comprising 17 faculties, 5 pre-university schools 9 museums and 16 secretaries. Most of these dependencies have and administer their own web sites, reason for which, although these can be accessed through the site of the UNLP, this site has problems regarding the decentralization of the information, opening of new browser windows resulting in a loss of control over the user, difficulty of having a common search system, among others. This is what the site of the University looks like:



Fig.1. UNLP homepage traditional site

- Sector A: Main menu. Most important access of the site.
- Sector B: Additional content.
- Sector C: Search, shortcuts.
- Sector D: Hyperlinks to external sites.
- Sector E: News.

Analysis of the use of the website

The usage statistics show a steady increase in visits since the launch of the website in May 2005. This can be observed in the following chart of the average of daily visits per month:

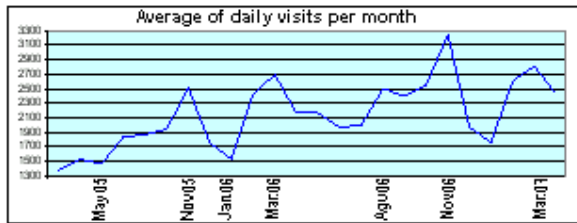


Fig.2. Average of visits per month

There is a clear increase in the visits in the months of March and November, which correspond to the start and end of the academic year, including the period of registration and enrollment in the courses.

The site has been analyzed according to the different ways of access, and it has been noted that, because of the permanent incorporation of contents to the website, there is a constant evolution in the access through search engines.

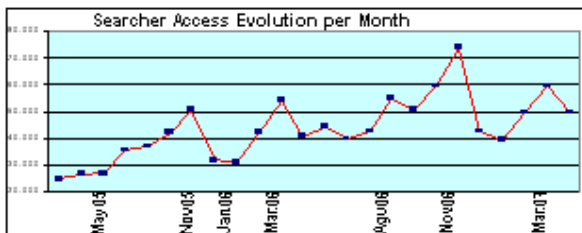


Fig.3. Searcher access evolution

Regarding the most visited pages, which is fundamental information for the design stage, specifically for the selection of contents for the mobile interface, the results are as follows:

TABLE I
MOST VISITED PAGES

Subjects	Visits
Syllabuses	362.195
News	237.721
Courses of studies	208.503
Authorities	154.964
Contests	71.869
Strategic Plan	69.097
Drawings of entrance to the schools	42.628
Postgraduate courses	30.877
Human Rights	19.021
Subscriptions Forms	18.480

It is important to emphasize the high degree of interaction with the users. Since the launch of the website there have been 14 polls which have been taken 43.000 times. There have also been 7200 e-mails and 75.000 subscriptions and queries on different specific services, such as contests, enrollment in courses, etc.

III. CHARACTERISTICS OF THE MOBILE WEBSITE

Towards the end of 2006, we proposed the development of the mobile website for the UNLP, which would be created by the Web development team of the Rectory of the University together with the Department of User-Centered Design of the Faculty of Computer Science.

We then planned a schedule of activities corresponding to a re-engineering process to suit the mobile version of the website.

TABLE II
SCHEDULE OF ACTIVITIES

Phase	Length	State
Pre-design	3 months	Finished
Design	2 months	Finished
Development of the Prototype	3 months	Finished
Heuristic Evaluation	1 month	Finished
Usability Tests	1 month	Finished
Re-design	1 month	Begun
Production	1 month	

Pre-design

The portal was analyzed from different perspectives -most significant content, most visited pages, periods of most visits, most requested information, most popular searches, among others.

We also focused on the development of mobile interfaces for educational websites, investigating mobile-specific design,

examples on the market, trends in the most common information and contents visualized in the mobile interface. During this phase, we analyzed the diversification of mobile phones on the market and their incidence in the design of the mobile interface. We also studied development alternatives for the website, as well as appropriate mechanisms to automatically support both its fixed and mobile Internet form.

Design

We worked on the content of the website, selecting, filtering and dismissing information. The content and the browsing structure were reorganized, focusing on interaction objects appropriate for mobile phones. The following section introduces the most important matters in relation to design.

Development of the prototype

At this stage we developed a high level prototype in order to perform an evaluation on end users. It is an evolutionary prototype, which means any necessary modifications will be introduced to the prototype itself, developing into the final product.

Development of the heuristic evaluation

The designers of the website verified the compliance of the prototype to W3C norms for mobile websites [9].

Each one of the suggestions was considered for correcting the prototype in any necessary aspect.

Usability Tests

We organized a usability test for the mobile interface on 30 individuals with different backgrounds in the use of cell phones and the website of the university in its fixed form. This stage is going to be described throughout the article.

Re-design

In this phase the prototype will be improved, solving the problems detected during the usability test. Hence, the mobile website will be launched with all assessments and usability tests completed.

Production stage

It is estimated that by the end of the current year the website will be accessible via mobile phone to the general public.

IV. Design aspects

The design of the mobile website consisted of a series activities contemplated in the design recommendations for this type of interface. This article will present a summary of these activities, together with the most important screen captions, describing the navigation system and the most relevant visualization aspects. The design process in its entirety can be found in the reference. [10]

During the development stage, we used mainly the simulator OpenWave SDK 6.2.2 [11] Physical cell phones were used for the usability test.

Applying design considerations regarding the content (filtering, dismissal and reorganization), browsing (by content, forward and backward, relocation of hyperlinks at the end of each page), mechanisms of interaction (minimizing the entrance of data, providing shortcuts, searches, hierarchical menus, radio buttons, lists), vertical scrolling and queries, the resulting main page is as follows:

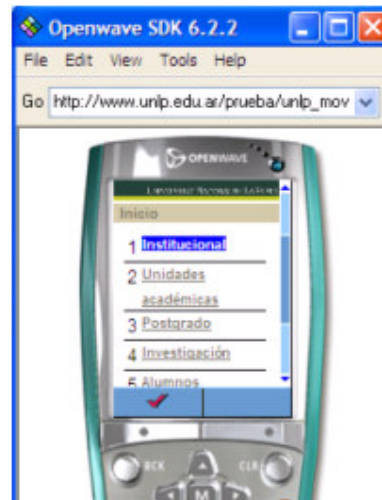


Fig. 4. Prototype

The hyperlinks located in section A of the traditional web site were located as hyperlinks in the main page, together with the most popular hyperlinks of the other sections, as indicated by the statistics of visits to the web site.

With the aim of providing shortcuts to facilitate browsing, each option was assigned a number. In this way, in order to access a section, the user can press the number, select it with the navigation buttons of the cell phone or with a stylus, depending on the device.

The heading of each page includes contextual information about the current section, the hyperlinks visited to get there and an icon to return to the main page.

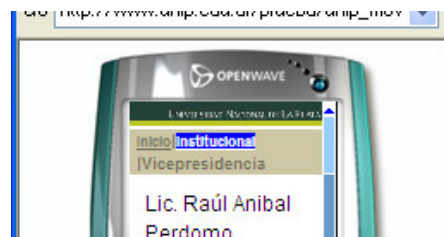


Fig. 5. Contextual menu

The original design considered the inclusion of an iconic bar for backward and forward browsing at the end of each page. However, in most mobile phones it did not display correctly.

Also in the heading, the logo of the UNLP is always visible in dark green. This logo will be modified to show only the initials, given the fact that in such reduced space the complete words do not display correctly.

The original design included a contextual menu which would display in the lower left corner of the screen, with many options.

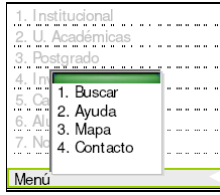


Fig. 6. Menu

However, WML does not support Javascript. We are currently analyzing alternatives to implement it.

The News section, one of the most visited of the traditional web site, was redesigned in order to show the information in a brief, concise and consistent way. A hyperlink, leading to a page with the news headings and their date, was included in the main page. Clicking on one of the news headings will display a brief comment on it. The display is as follows:



Fig. 7. News headings and details

V. IMPLEMENTATION ASPECTS

The site of the UNLP is developed in PHP, Perl on the side of the server, and on the side of the client uses Javascript, Flash and Applets written in Java. The database engine is PostgreSQL.

Regarding the mobile site, the prototype was programmed in WML, PHP4 and the editor of choice was VIM. The site itself is over a thousand lines of code and is located in a computer with Linux, is running an Apache server. Most of the information in the mobile website is dynamically generated, to keep consistency and facilitate maintenance.

Cascading Style Sheets were used but, based on the different usability tests performed on different cell phone models, during which sometimes it was impossible to browse the site, their convenience will be further analyzed.

VI. DETAILS OF THE USABILITY TEST

The test was developed taking into account the syntactic and semantic knowledge the users had. In this context, syntactic knowledge refers to the understanding of the use of mobile phones, while semantic knowledge refers to the comprehension of application aspects, in this particular case, regarding the UNLP and the information included about it specifically in the traditional website.

- **Group A:** individuals with little experience in the use of mobile phones and little knowledge of the website of the UNLP.
- **Group B:** individuals with little experience in the use of mobile phones and full knowledge of the website of the UNLP.
- **Group C:** individuals with vast experience in the use of mobile phones and no knowledge of the website of the UNLP.
- **Group D:** individuals with vast experience in the use of mobile phones and knowledge of the website of the UNLP.

Organization of the test

Before they accessed the mobile website of the UNLP, the participants were given a brief introductory talk about the prototype and the evaluation they were about to undergo. They were asked a series of questions in order to determine their profile and their experience in the use of cell phones and the website of the UNLP. After this, they began the interaction with the mobile website, completing the activities proposed.

There was an examiner present during this process, registering the results of the interaction as observed. The examiner also recorded any case in which a person requested their help.

Many different brands and models of mobile phones were used, among which were Sony Ericsson K300, Motorola E1 Rocker, Motorola V235 and Nokia N76.

Activities proposed

The activities proposed included punctual researching tasks, such as activities 1 and 2, and more general, like activities 3, 4 and 5.

- **Task 1:** Find out the name of the General Secretary of the UNLP.
- **Task 2:** Find out the e-mail address of the postgraduate secretary of the Faculty of Exact Sciences.
- **Task 3:** Find out which are the degree courses given in the faculty of Fine Arts.
- **Task 4:** Find out the news of this week in the UNLP.
- **Task 5:** Find out which are the postgraduate courses given in the Faculty of Humanities.

Form design

The first section of the form focuses on an evaluation of the syntactic and semantic knowledge of the user, in order to establish a profile. The structure is as follows:

Fig. 8. Evaluation

The forms below describe the activities proposed, followed by options to specify the result, constituting the evaluation itself:

Fig. 9. Example of task

Finally, at the end of the form there is a space for the user to provide their opinions and suggestions. This space was designed in the following manner:

Fig. 10. Opinions section

VII. RESULTS OF THE EXPERIENCE

Group A: individuals with little experience in the use of mobile phones and little knowledge of the website of the UNLP.

- Took the longest -15 minutes- to complete the activities.

- Browsed everything up to the end, looking for a way to return to the previous page.
- Complained about activity 3 because the pages of the faculties are too extensive.
- Because they had very limited semantic knowledge, they had to be explained what institutional and academic unit mean. For this reason, activities 1, 2 and 3 were completed WITH help.
- Were alarmed when they saw error pages requesting the upload of a non-valid format.

Group B: individuals with little experience in the use of mobile phones and full knowledge of the website of the UNLP.

- Took less time and felt better.
- Read until the end to find out how to return to the previous page or, if the text was too long, went back to the main page.
- Complained about activity 3 because of the length of the pages and unintelligible icons.
- Requested access from the main page to the syllabuses of the courses.

Group C: individuals with vast experience in the use of mobile phones and no knowledge of the website of the UNLP.

- Were frustrated when they could not locate the back button.
- When playing with the keypad to accelerate accesses they were surprised when they unwillingly called one of the telephone numbers shown in the information.
- They felt it was slow.
- They complained of long pages. Hence, activity 3 took them some time to complete.
- They complained because the numerical shortcuts did not work properly and requested the back button to be in the cell phone.
- Had to be explained the concepts of academic unit and institutional.

Group D: individuals with vast experience in the use of mobile phones and knowledge of the website of the UNLP.

- Idem group C without need of explaining the concepts of academic unit and institutional.
- Requested access from the main page to the curriculum of the courses.

In short:

Profile	Group A
Activity 1	Difficulties. Requested help because they did not understand the concept
Activity 2	Difficulties. Requested help because they did not understand the concept
Activity 3	Difficulties. Requested help because they did not understand the concept . Could not find the back option in long pages
Activity 4	Had difficulties in returning to the main page, from the back button and from the context bar because it is difficult to distinguish which option is selected and where the user currently is
Activity 5	Had difficulties in returning to the main page, from the back button and from the context bar because it is difficult to distinguish which option is selected and where the user currently is
Comments	Could not find the back button . Complained about long pages. Could not understand the icons and the context bar. Were alarmed at the sight of a non-valid format error

Profile	Group B
Activity 1	Completed correctly
Activity 2	Completed correctly
Activity 3	Complained about long pages. Back option difficult
Activity 4	Completed correctly
Activity 5	Completed correctly
Comments	Could not understand the back icons either. Did not like long pages. Used the context bar to return to the last page

Profile	Group C
Activity 1	Requested an explanation of the concept
Activity 2	Requested an explanation of the concept
Activity 3	Had difficulties in returning. Complained about long pages. Pressed the wrong buttons on the phone, making unwilling phone calls. Wanted access from the numbers
Activity 4	Wanted access from the numbers. Had difficulties in going back to the main page
Activity 5	Good
Comments	Idem previous. Complained about the numerical shortcuts. Requested the back button to be in the cell phone

Profile	Group D
Activity 1	Good
Activity 2	Good
Activity 3	Idem group C
Activity 4	Idem group C
Activity 5	Good
Comments	Idem group C

Fig. 11. Summary tables

VIII. CONCLUSIONS

From this first test performed on real potential users, using physical mobile phones, we obtained critics and suggestions which will be taken into account in the stages to come.

Most of the participants agreed that:

- The icons are not correctly displayed, which causes the back button to be difficult to find. This had to be explained by the examiner present in the evaluation. Different alternatives to solve this problem will be analyzed.
- The context bar does not correctly display which option is selected and which is not. Many participants sought it to find the back button.
- It is impossible to go back from certain pages, for example, the long ones found when clicking in an academic unit. After a long time they arrive at the end,

and cannot find the back option because the image is not clear.

- The most experienced in the use of cell phones want to use the keypad to go back, but this option is not always available and this frustrates them.
- They suggest that when the user enters academic unit he/she should find information regarding the address and telephone numbers. Its degree and postgraduate courses should be hyperlinks.
- The information displayed about the courses of studies should only be its name and length.
- Information regarding research activities should not be included, given the lack of normalized information.
- It is necessary to eliminate access to documents in formats which are not supported by cell phones, such as .pdf
- Some users were alarmed because occasionally, when trying to return to the previous page, the cell phone began calling a telephone number included in the information displayed.
- It is necessary to correct the administration of sessions. When a second participant accessed the mobile website, this remained in the page in which the previous user had finished the evaluation, and cannot return to the main page. This happens in the lists of academic units.

Given the amount and versatility of information available in the website, and its high update rate, it is not an easy task to determine the best organization possible and filter the content in accordance with the needs of the mobile version. Maintaining the consistency and update rate of both sides is not trivial, and although we foresee an automatization mechanism to obtain the interface of the mobile website, this implementation is not urgent, given the existence of the traditional website.

References

- [1] Instituto Nacional de Estadísticas y Censos. Estadísticas de Servicios Públicos. August 2007. <http://www.indec.gov.ar/>
- [2] Site of Indiana University. www.indiana.edu.
- [3] Site of the University of Baltimore. www.ubalt.edu.
- [4] Cornell University Unplugged. <http://enterprise.usa.siemens.com/products/solutions/hipathwireless/mainColumnParagraphs/03/document/Cornell.pdf>
- [5] The Wireless University Forum. www.twuf.com
- [6] Site of the National University of La Plata. <http://www.unlp.edu.ar>.
- [7] The website of the UNLP is amongst the best of the country. http://www.universia.com.ar/portada/actualidad/noticia_actualidad.jsp?noticia=18367
- [8] The book of the Hundredth Anniversary. Editorial de la Universidad Nacional de La Plata (2005)
- [9] W3C Mobile Web Best Practices checker (Beta). <http://validator.w3.org/mobile/>
- [10] Diaz, Harari, Amadeo. *Design Considerations for an Educational Website*. CACIC 2006.
- [11] <http://www.openwave.com>